

**JET
SPECIAL!**

F&B REVIEWS:
**4 Ducted-Fan
Kits**

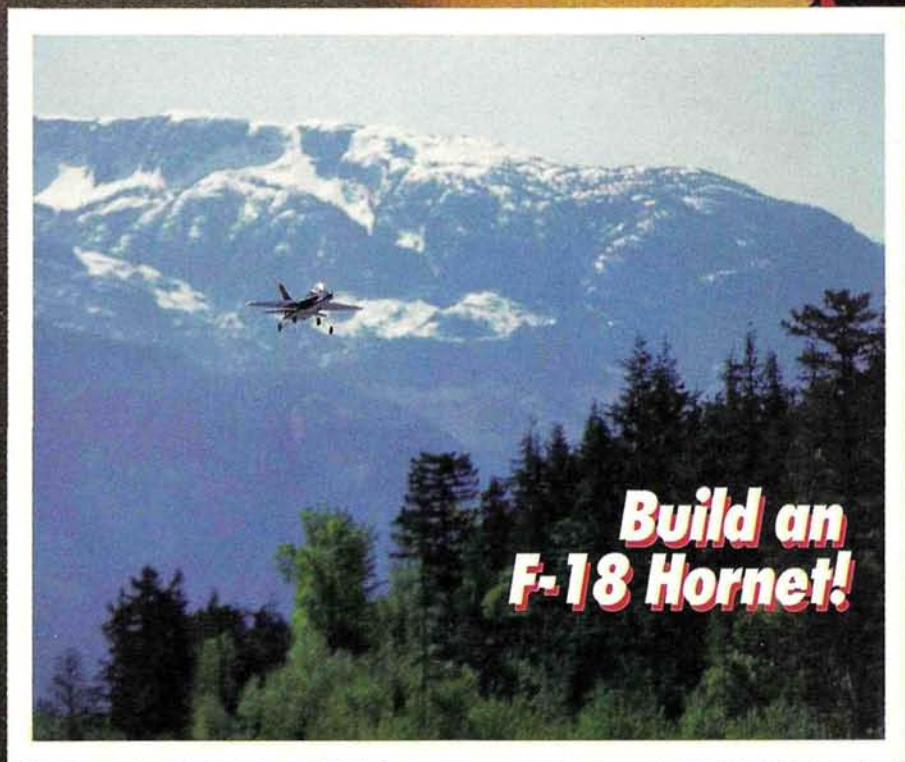
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ON THE COVER:

NAS Miramar or Oceana? Steely eyed Lt. Steve Stunning (call-sign "Cheech") checks his 10 from the cockpit of his A-4 Mongoose. What he sees is one of his fellow naval aviators on final with a Blue Angel F/A-18. Actually, Lt. Stunning is a DGA pilot figure mounted inside a Yellow Aircraft A-4 ducted-fan model, and the "Blue Angel" is the Sport Hornet that was designed by Rick James and is presented as the construction article in this, our Jet Special issue. Kodachromes by Rich Uravitch and Glen Frankland.

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Editorial

by RICH URAVITCH

ONE STEP CLOSER!

With all of the activity in ducted fans going on, we decided to bring you another theme issue...one dealing with jets! When we first started the "Jet Blast" column back in 1983, we were pretty much convinced that this area of our sport would be growing, and we decided to keep track of what was going on and to keep you as "up to speed" as we could. To that end, I think we've succeeded. If our mail is any indication, more and more of you are either already involved, you're just getting involved, or your interest has at least been sparked by the fascinating simulation of R/C jet flying through ducted fans. I've reviewed what I said in those early installments of "Jet Blast" and noticed that what was said then still holds true. What *has* happened to change the face of things is the widespread availability of proven components at reasonable prices, and this has enhanced the growth of jet modeling tremendously. Let's look at some examples of what strides have been made in six years.

Back then, we had two production fan units to choose from: the JHH Turbax I (which was designed for the .45-size high-performance engines) and the Byrojet (which originally used the high-revving .60s of the day). It's a testament to the design of these units that they're both still available in basically the same form and are still widely and successfully used today. Capitalism being what it is, they have been joined by at least two other domestic units, the JMP Dynamax and the BVM Viojett. This doesn't consider the imported units and the others on the way, nor the attrition of the "no way in the world" units, like the defunct Force Air fan.

Kits, too, have proliferated. While we were once offered a choice of a small number of designs, we now have a choice of which version of a particular jet we'd like to build. Materials have now become as universal as other segments of the sport; we now have fiberglass-and-foam kits, balsa kits, and even

plans for the scratch-builders among us. Rapidly disappearing are the old myths that you have to be a super flier to control one of these things, or you'll throw away your ducted-fan engine after a dozen runs—if it lasts that long! Airplanes like the Byron F-16 or Parkinson Regal Eagle blow these untruths into the weeds. Interestingly enough, in my experience, the people who perpetuate these beliefs are those whose only encounter with a ducted-fan airplane was as close as they could get to one on a table at a static show! Don't get me wrong: I'd no sooner recommend a ducted-fan airplane

to a rank novice than I

would suggest Michael J. Fox start dating Joan Collins...he might have the interest, but he's probably not ready!

We now have higher levels of prefabrication than we've ever had before. I've been quietly beating the drum for an ARF jet for general, the accep-

some time. In

tance of ARFs by fliers should be evidence enough of the shrinking availability of building time. That observation, coupled with the measurable growth of ducted-fan activity over a relatively short time, should make a reasonably convincing argument for someone to jump in and provide the fanatics with an ARF jet that we can fly while we're building something else.

The reason for the "One Step Closer" title of this editorial? That pretty F-16 you see above is a soon-to-be-released offering under the Hobby Shack "EZ" banner. Before you send them your wallet, charge cards and promises of your first-born, look towards the tail. You're right: It's a prop and a pusher; but understand what's happened? The engine and prop have moved from the nose to the tail; the next step could be to lose the prop altogether and put the engine *inside*!

Hope you enjoy this issue; let us know!



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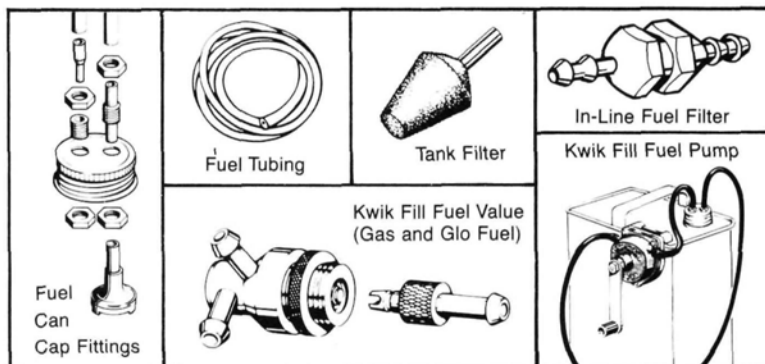
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Airwaves

WHERE TO WRITE TO US

If you're writing to the editors (and we'd love to hear from you), please be sure to address your letters to "Airwaves" Model Airplane News, 251 Danbury Road, Wilton, CT 06897. Only subscription orders and inquiries are handled by our Customer Service Department in Mount Morris, IL; other mail addressed there must be forwarded to Connecticut, and this leads to long delays.

Last, But Not Least, Resort

I'm writing to you as a last resort. I've been searching for copies of the original airframe plans for the P-51D Mustang that show full and accurate cross-sections of the fuselage. I've asked at hobby stores, and they knew nothing about where I could get them. I've written to a company in Britain for their plans. I've bought a balsa stringered P-51D kit. Finally, I bought an accurate plastic model plane kit, and put a lot of work into cutting it up to get cross-

sections of the fuselage. Unfortunately, none of these methods worked out; I wasn't able to get enough cross-sections.

Do any companies supply model kit manufacturers with the original plans to produce the models? I'd appreciate some guidance or a reference to someone who deals in these types of plans.

I enjoy your magazine very much and always look forward to reading it.

MARK RENTON
Scarborough, Ontario

Mark, as popular as the Mustang is, it's still going to be difficult, if not impossible, to locate original airframe plans. There have been literally reams of data published on the 51, probably more documentation than the original had, but I don't recall ever seeing the type of drawings you're looking for. I don't know just how accu-

rate a model you require, but I wouldn't necessarily hang my hat on some of the polystyrene offerings, which are sometimes way off, especially in the upper cowl area. Gary Lavarack of Warbirds is now developing a 1/4 scale, all-metal P-51 that I wrote of in my November '88 editorial. He said his drawings were produced by measuring a full-size P-51. They should be accurate! Contact him at 122 Naubuc Ave., (NAP Bldg.), Glastonbury, CT, 06033. Anyone else have any suggestions?

RAU

Emperor Ming's Flying Machines?

About 35 years ago, in either Model Airplane News or Air Trails, an article was published pertaining to the construction of a 1/2A free-flight spaceship-type plane. The model didn't fly too badly, so I enlarged the plans for R/C. Unfortunately, radios in

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those days weren't very reliable, so I never found out how it would control. On its only flight, without a working radio, the plane(?) had a slow turning climb and a gentle glide.

A few days ago, I was going through my slides and ran across pictures of both planes. I can't resist the challenge of trying again for an R/C spaceship. While I could probably draw my own plane from the photos, I can't remember the balance point

and could use the original article and plans. If you didn't publish that article, could you direct me to a possible source for those plans?

JAMES C. SMITH
3353 Videra Drive
Eugene, OR 97405

James, thanks for returning me to my pre-teen modeling years, but I might need some help on this one. If memory serves me, the design appeared in an old issue of "Air Trails Hobbies for Young Men" (now, that was a title!) and was presented by a Roy Clough...I think. We've printed James' complete address for any readers who might be able to help.

RAU

Elektro-UHU
I enjoyed T. Montagna's article about the

Electric World Championships in St. Louis in the February '89 issue of *MAN*. But, there's an error in the sentence that reads: "Werner Detweiler, who won the pylon racing...and is the designer of the Elektro-UHU, the speed of which was very hard to believe; it seemed to be faster than glow-engine-powered Quikie 500s."

Mr. Detweiler did indeed design the Elektro-UHU, but the extremely fast air-plane that raced against the glow-engine racer was Detweiler's Race Cat Pylon Racer, not his Elektro-UHU. The Elektro-UHU is a high-performance thermal soaring electric-powered sailplane that's reasonably fast for a glider, but it certainly wouldn't ever be able to compete in a pylon race.

JIM MARTIN
Brentwood, TN

(Continued on page 10)

The System.



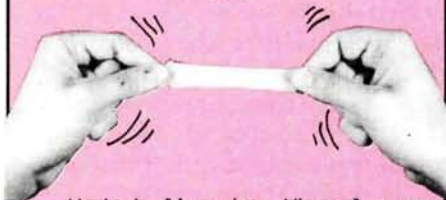
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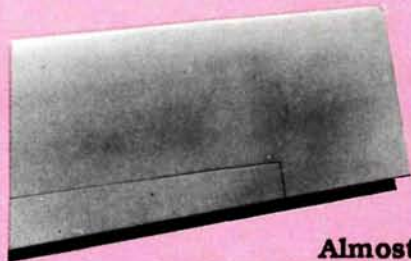


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Airwaves

Thanks Jim, but how would you know?; you only own the company (Hobby Lobby International) that imports the Elektro-UHU kit! As far as being competitive in a pylon race: Remember, he who finishes when no one else does, wins!

RAU

Solving for "X"

I've been a subscriber to *MAN* for some years now (keep up the good work!), and I'm planning to build a 1/4-scale X-15 rocket plane for international competition. I'm looking for all the help I can get from *MAN* and all you R/C enthusiasts out there. I know that three prototypes were built by North American Aviation, but the U.S. Embassy in Stockholm says that this company no longer exists.



Is there a book showing type number, overall colors, close-up pictures of external and internal details? Is there a three-view drawing or plastic kit? What happened to North American Aviation?

Again, many thanks for your assistance.

CLAES G. SKOOG
Ammeberg, Sweden

Claes, this sounds like a really adventurous project, and we'd like to be kept advised of your progress. The best information source I know of is the Aerofax Datagraph 2 on the X-15 series. It's available from Zenith Aviation, P.O. Box 1/MN019,

Osceola, WI 54020. It contains dozens of photos (some in color), great detail shots, and a chronology of all 199 flights in the three-airplane test program. Revell has re-released a plastic kit, and the reason you can't locate North American Aviation is that they were absorbed by the Rockwell Corporation. Hope this helps.

RAU

1/4-Scale Jets?

I've bought these books: "Giant Steps/A Book of Giant R/C Aircraft," "Building Big Is Beautiful," "Building and Flying Giant Scale R/C Aircraft." These books feature 1/4-scale propeller-driven aircraft. I'd like to buy any books and magazines that deal exclusively with 1/4-scale jet aircraft.

Can you provide me with the names and addresses of suppliers of 1/4-scale jet aircraft plans, kits, books and magazines?

GEORGE C. A. RICHARDS
St. Michael, Barbados

George, the only jet, 1/4 scale or larger, that's commercially available at present is the 40%-scale BD-5J produced by Byron Originals, whose address you'll find in our Ducted Fan Source Directory in this issue. We did a "Field and Bench" review on this kit in our June '88 issue. To give you a feel for the size of airplanes you're talking about in 1/4 scale, let's look at a few examples: a 12-foot-long F-16, a 15 1/2-foot-long F-14, a 9 1/2-foot-span F/A-18; or how about an 18-foot MiG-25, not to mention a 62-foot C-5? Great projects, but a bit large for my workshop!

RAU

Decathlon Power Choices

I subscribe to *Model Airplane News* and enjoy it very much. Have you done a construction article on the EZ Decathlon 40? If you have, could I obtain a copy? I'd like to know the size and make of engine used on this kit.

TOM JONES
Rome, NY

Tom, Art Schroeder reviewed the Hobby Shack EZ Decathlon back in the Dec. '84

(Continued on page 12)

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Wing Span 62½ inches
Wing Area 770 square inches
Engine Size 10 cc
90 or 120 four stroke

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SPECIFICATIONS:

Wing Span 65 inches
Length 65 inches
Wing Area 845 square inches
Recommended Engine Size 10 cc
90, or 120 four stroke

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SPECIFICATIONS:

Wing Span 63¾ inches
Wing Area 700 square inches
Engine Size .50-.60 (Glow)
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Airwaves

issue of MAN. He chose the Webra Speed .60 for power and seemed pleased with the result. I used an O.S. 61 4-stroke in my seaplane version for the Oct. '88 issue and, in addition to having a terrific sound, the power was more than adequate. Back issues of both are available for \$3.50 per copy.

RAU

Just Plane Memories

The cover picture on the January '88 issue brought back memories of 60 years ago. There must be thousands of stories similar to mine.

At the age of 10, I constructed (can you believe) a Sears & Roebuck pusher? The cement must have been included in the kit, because I wouldn't have known what to use. Anyway, it did fly well. Had it not, I wouldn't have known what corrections to make. No matter, this was a new world, with a new kind of wood and new "smells"—I was hooked for life.

Three years later, a friend lent me an issue of MAN. I wasn't aware that a model magazine even existed. Needless to say, MAN and C.H. Grant became my bible and teacher. I bet MAN will be around for another 60 years.

Joe and Randy are doing a super job for MAN. "Small Steps" was long overdue, especially in the manner Joe and Randy are handling it.

RALPH PEARSON
Falconer, NY

Ralph, thanks; it's letters like yours that make all of us on the Air Age team proud to put together a magazine that you enjoy. We sure plan to be around for another 60 years, and yes, we agree, Joe and Randy are doing a super job.

RAU

Plans Search

I'm looking for a very exact model of a B-52 and the X-15, but I've been unable to find any plans. I've been a fan of R/C for two years now and have a little experience in model rocketry. I consider this a prime project, but I need your help in locating some plans.

THEODORE FRITZ
Stonecreek, OH

Ted, see our answer to Claes. Perhaps you two could join forces? One, the X-15, the other the B-52; we'll look for the test site!

RAU

Stamp Petition

Over 50 years ago, your magazine brought news and information of model aviation to the U.S. and to the world. Few magazines can claim such a record of achievement. Congratulations! I hope that MAN continues for another 50 years.

I'm trying to get the U.S. Postal Service to produce model aviation commemorative stamps. I hope that I can win the support of you and the modeling community for this project.

I've written to the Citizens Stamp Advisory Committee in Washington, D.C., and have received back the usual "thank you for your interest" letter. I hope to gain your support for this project and to let your readers know that there is a petition for model aviation commemorative stamps. Your readers can get the petition by sending me an SASE, and I'll send as many as they need. I hope that you find this project worthwhile and that you'll tell your readers about it.

JAMES P. DARRACOTT
14511 St. Germain Dr.
Centreville, VA 22020

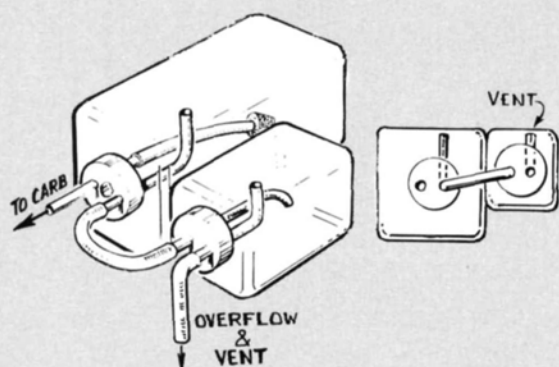
Jim, this is a project that could be just the thing to enhance our image and increase public awareness of our multi-faceted sport. C'mon folks, one guy starts it, we all support it, and it happens. Let's make this a real maximum effort 'cause we deserve it. No excuses for apathy now, Jim's got the petitions. Let's do it!

RAU

We welcome your comments, opinions, and suggestions. Letters should be addressed to "Airwaves," Model Airplane News, 251 Danbury Road, Wilton, CT 06897. Letters may be edited for clarity and length.

Hints & Kinks

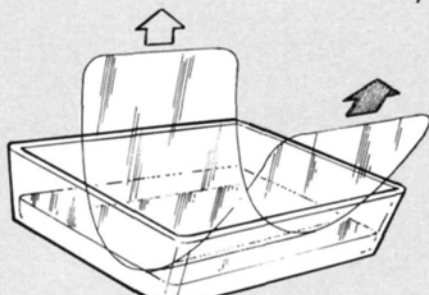
by JIM NEWMAN



DUAL TANKS

Lacking enough room between the fire wall and the instrument panel for a 16-ounce tank, Bob glued a 12-ounce and a 4-ounce tank side by side using silicone sealant, then he plumbed the tanks as shown. As the level in the larger tank falls, fuel is drawn out of the smaller tank. Note that the vent of the smaller tank is level with the top of the larger tank to prevent the tanks from draining overboard when you aren't looking!

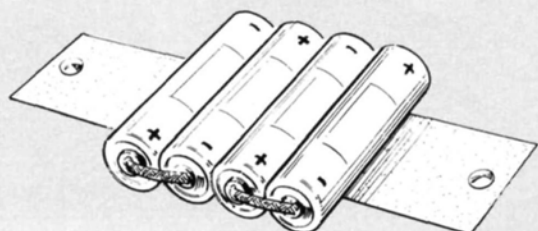
Bob Guilfoyle, Ukiah, CA



CHEAP WINDSHIELDS

Ask your doctor for his old X-ray negatives. Pour about 1 1/2 inches of Clorox® bleach into a glass dish, then hold the ends of the negs so that they're bent as shown. Rinse the films in the bleach to remove the black emulsion, then wash in cold, running water to leave a clear plastic sheet that's ideal for making windshields and canopies.

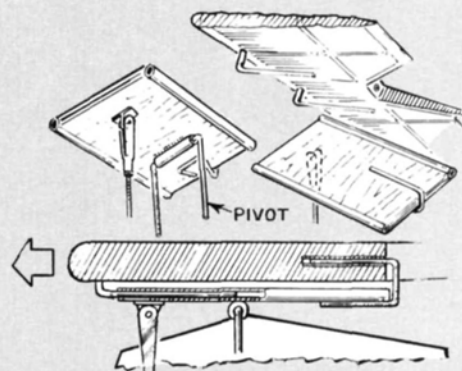
David Byrd, Johnson City, TN



NI-CD SOLDERING JIG

This holds Ni-Cds very securely while soldering. Lay masking tape or duct tape on the bench, sticky side upwards, and secure it with tacks or patches of tape. Press the Ni-Cds into place to hold them, and when soldering is completed, fold the flaps over, then wrap with foam, etc.

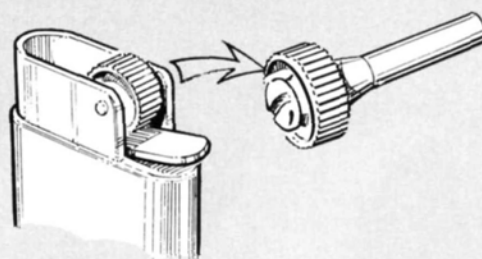
Charles Fries, Mechanicsburg, PA



KNOCK-OFF STABILIZER

Owing to the inertia of the high-mounted tail, the sudden halting of a T-tailed glider can result in a broken fuselage. To minimize the risk of this, our contributor has made a pivoting platform with tubes along each edge and a wire pin at the trailing edge. The stabilizer has two wire pins and a tube at its trailing edge. On assembly, the stabilizer slips onto the pins and, during an abrupt stop, it shoots forward to release itself. The sketches show the top and bottom of the platform, but the glass tape and epoxy or CA that secure the tubes and wire fittings aren't shown. (Henning was a member of the 1938 Swedish Wakefield team.)

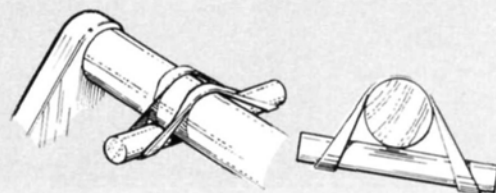
Henning Schroder, Draguignan, France



DISPOSABLE ROUTERS

Save the thumb wheels from old cigarette lighters, because they can be mounted on a regular moto-tool mandrel to make small, fast-cutting routers and grinders.

Levent Suberk, Bursa, Turkey



RUBBER BAND STORAGE

A few rubber bands looped over the flight-box handle and around a short dowel puts them conveniently at hand. Be warned, though: Strong sunlight causes the bands to deteriorate rapidly, so drape a clean, white cloth over them.

Munden Critch, Mount Pearl, NFLD, Canada

Model Airplane News will give a free one-year subscription (or one-year renewal if you already subscribe) for each idea used in "Hints & Kinks." Send rough sketch to Jim Newman, c/o Model Airplane News, 251 Danbury Rd., Wilton, CT 06897. BE SURE YOUR NAME AND ADDRESS ARE CLEARLY PRINTED ON EACH SKETCH, PHOTO, AND NOTE YOU SUBMIT. Because of the number of ideas we receive, we cannot acknowledge each one, nor can we return unused material.

BOB VIOLETT MODELS



This view of the Viper shows its generous size inlets, which eliminate the requirement for "cheater holes" or auxiliary inlets.

FEEL THE NEED for speed? With its range of 25 to 175mph, awesome vertical performance, and the ability to easily take off and land on grass, this new high-tech model from Bob Violet Models* is the one for you!

When I first saw the Viper on display at the 1987 Toledo Show, I knew I wanted it. It literally looked as though it were going at over 100 mph just sitting still! All my local club fields (in Central Ohio) are grass, and the idea of taking off in 100 feet or less with a fan jet was very appealing. The Viper's aerodynamic features make this possible, and it's also very stable at both low and high speeds. The model has a slightly drooped nose with a generous nose-moment arm, swept wings and tails, LEXs (Leading-Edge Extensions), flaperons, and the optional NACA droops. The Viper's sleek fuselage gives minimum

VIPER

by TERRY NITSCH

AN EXTREMELY RAPID, WELL-EXECUTED KIT
DESIGNED FOR HIGH PERFORMANCE



Reviewer Nitsch seems happy with his model. At Toledo, he took 1st place in Pattern with the Viper.

drag and maximum speed.

Carbon-fiber composites are used extensively. Wing and stab spars, landing-gear flex-plates, dihedral wing joiners, wing-mounting hardware, servo trays and trailing-edge reinforcements are all made of this material. Special fittings are also molded of carbon-fiber nylon, including engine-

cowl retainers, the pipe mount and the hatch-retention system. This system provides easy hatch and cowl removal without

the use of bolts and nuts. The new molded-carbon composite landing-gear flex-plate system absorbs the takeoff and landing loads (even terrible landings!) and prevents ripping out the retract units or doing other structural damage to the airframe.

The ducting system is also excellent. Fully molded from epoxyglass are the inlet lips, inlet tubes and tail-pipe tubes. The aerodynamic shapes of these parts have been

SPECIFICATIONS

Type: Sport jet

Wingspan: 50 inches

Length: 67 inches

Weight: 10 pounds 2 ounces

Power: VIOJETT Fan KBV 72 engine

Speed Range: 25 - 175mph

Radio: 6-channel with mixer for flaperons

Features: Molded and machined carbon-fiber components, epoxyglass fuse, hatches, inlets and ducts, K&B paint with Del Glo clear. Kit includes all balsa, machined GB 125 formers, hinges and linkages.



Above: Certainly one of the prettiest jets available, the Viper can also claim its family to be the fastest.

Left: Viper demonstrates grass-field-operation capabilities. Note flaperons deflected downward to provide additional lift.



designed and manufactured to really *work*. If the Viper is assembled as directed, modelers who want the excitement of flying a prototypical model jet are assured of success.

CONSTRUCTION: I recommend that you first read through the assembly manual to become familiar with the construction techniques used to assemble this high-tech model. The manual contains drawings, photos and text that explain every detail of construction, radio installation, finishing and conducting your first flight profile. There are also two full-size instruction sheets for flying surfaces, and silhouette drawings of the model for developing paint schemes. The manual even suggests the use of certain types of adhesive (Loctite* and ZAP*) to complement the Viper's ultralight, ultra-strong construction techniques.

- **Fuselage:** Begin fuselage construction by sanding the inside glass and outside seam with 80-grit sandpaper. A 3M Scotchbrite pad (No. 7447) is then used to burnish the whole of the fuselage exterior. Cutouts for the starter door, inlets and belly pan are made according to the drawings in the manual. The starter door is a piece of 1/2x2 1/2x.014-inch carbon fiber that's glued to the forward 1/2-inch fuselage recess. This allows the aft section to be pushed in for the starter probe.

Worthy of mention is the Viper's glasswork. The epoxy and Kevlar fuselage, hatches, inlets and tail tubes were ob-

viously made in high-quality molds and allowed to cure properly; they're literally ripple-free!

"FLASH—TOP GUN JET MEET WON BY TERRY NITSCH. HIS BVM AGGRESSOR II WAS UNOFFICIALLY CLOCKED AT 187.7 M.P.H.!!"

to the intakes and fuse cheeks. (These lips are "handed" and marked as such.) Remove any glass on the fuse or the duct

When you've pre-assembled and installed the intake ducts, the opening is completed by gluing the molded intake lips

that might interfere with the fit of the epoxy and microballoons. *No sharp corners are allowed on intake lips.* A smooth fillet, top and bottom, is important for proper air flow! *The shape of the lip is also important and shouldn't be altered.*



Starting procedure has probe inserted through carbon-fiber "door" on fuselage side. Hex-ball driver engages spinner screw.

Formers should be trimmed as necessary so they don't cause bulges in the fuselage surface. These high-stress formers are machine-cut to shape. They're a composite of 1/8-inch grain balsa, laminated on both sides with epoxyglass, and they're stronger and much lighter than plywood! To glue in all the formers, I used a combination of 15-minute epoxy, microballoons and milled fiber in a 50/50 mix. (This combination is very strong and allows for nice fillets in the glued

VIPER

joints.)

- **Wings:** Wing and stab cores are accurately cut, and their alignment positions are accurately molded into the fuselage, so it's difficult to end up with anything but a true and straight-flying model jet.

The foam-wing structure is Bob Violett Models' Magnacore—a unique combination of foam, molded and machined carbon-fiber components and balsa wood. The finished product is extremely strong and very light.

Construction is started by preparing the cores and installing all the internal structural members. *Care must be taken at this point to ensure you make a right and a left wing.*

To install the landing-gear flex-plates, start by making the R.H. assembly. Lay one flex-plate on the plan so the retract cutout matches it. Position the blade spars and CA-molded J-mounts to

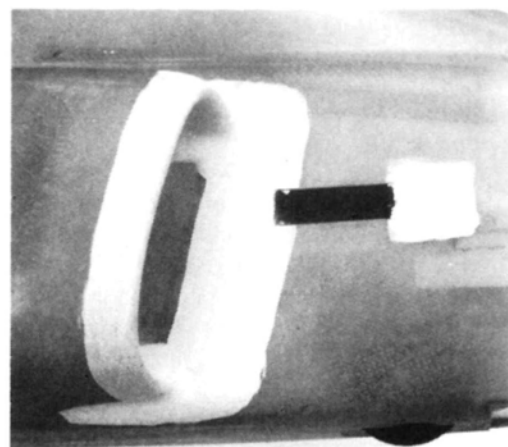
smoothness. Locate the carbon-fiber reinforcing strip on the foam, refer to the full-size plans, and mark the core with a pen. After sanding the $\frac{3}{8}$ -inch-wide groove using a straightedge as a guide, apply epoxy to the back of the strips and glue them to the foam.

Prepare the wing skins by marking them "left top," "left bottom," etc., on the inside surface. Place the skin, outside-surface-down, on the glass with the T.E. $\frac{1}{4}$ inch from the glass edge. Bevel from the $\frac{3}{8}$ -inch line back, leaving the edge half of its original thickness. Do this to all four skins, using No. 220 paper on a block. Cut the $\frac{1}{4}$ -inch CF.007 strips to length and Zap-A-Gap to the bottom skin T.E. on the beveled area. Trial-fit the skins to the cores and see that the trailing edges come together neatly.

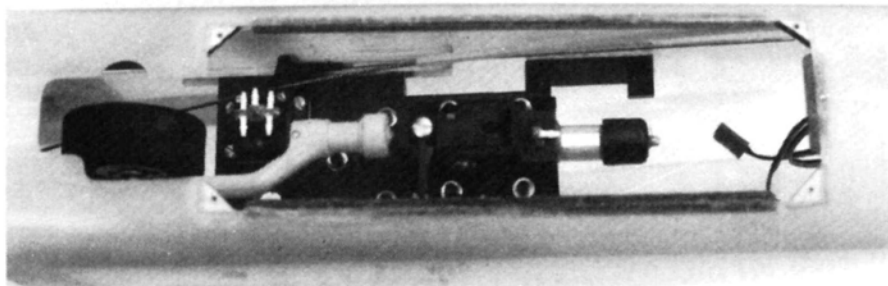
- **Wing-skin application:** Loctite's new Spray Adhesive was used. (It's extremely important to follow Loctite's directions.) Mask the trailing edges of the skins to allow them

to be Zapped together, and then apply the spray adhesive. Lay the bottom skin on the glass surface, and roll the core onto the skin, aligning the core T.E. with that line drawn $\frac{3}{8}$ inch forward of the skin T.E. Be careful not to twist the core.

Apply Slow Zap to the T.E. CF.007 strip on the bottom skin. Apply the top skin, press the trailing edges together on the glass with a full-length straightedge and apply Zip Kicker. Set the wing in the bottom cradle and burnish down the skins with the palm of



Inlet ducts are blended to fuselage to ensure undisturbed airflow to fan. Black rectangular object is carbon-fiber "door" for starter probe.



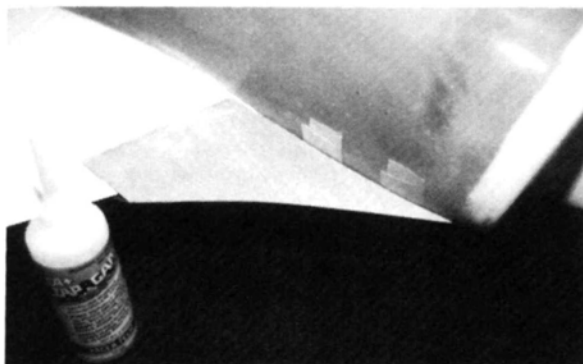
Nose-gear retract installation with access hatch removed. Robart P-51 cover used as dress-up to eliminate bare strut wire's "spindly" appearance.

the spars. Bosses on the J-mounts align with the holes in the flex-plate.

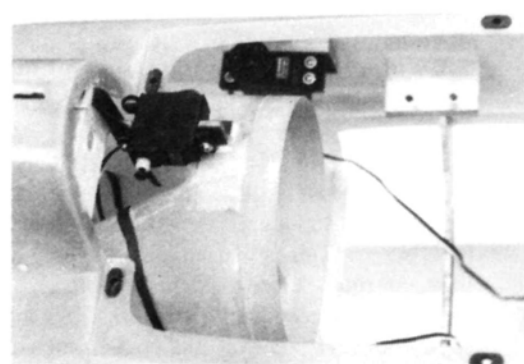
Flex-plate attachment is accomplished by installing eight No. 4 self-tapping screws through the holes molded in the flex-plate and into the bosses on the J-mounts. The left assembly is made by positioning spars directly on the plans, and marking and gluing the J-mounts from the opposite side.

This system allows damaged or broken flex-plates to be replaced by removing a small portion of the wing skin. *Do not glue the flex-plate to W-4 or W-5, because it must remain free of these structures to function properly.* Following the manual, install the rest of the wooden parts in the wing. Lay masking tape on the foam next to the wooden parts that need flush trimming.

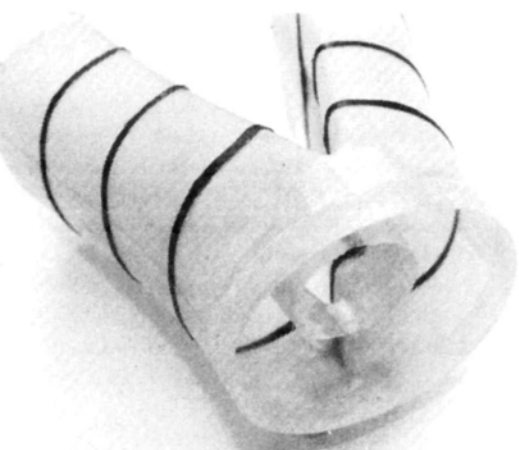
After flushing-up the structure, check for



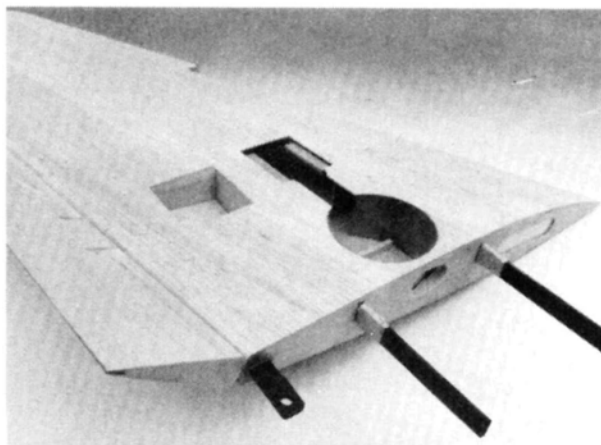
Leading-Edge Extension (LEX) is permanently attached to wing. Double layer of masking tape on fuselage is to establish and maintain LEX-to-fuselage clearance.



The inlet duct installed with in-flight mixture-control servo located on top. Throttle servo is mounted to fuselage side.



The inlet-duct assembly joined and ready for installation. Note carbon-fiber wrap to prevent distortion, collapsing.



Right wing panel ready for finishing. Note carbon-fiber insert in trailing edge of flaperon. Provides "ding" resistance while maintaining sharp edge.

your hand.

When the cores have been skinned, trim the leading edges flush with the foam and square up the root and tips. Protect the blade spars when scoring by wrapping them with masking tape. Apply the $\frac{3}{8} \times \frac{1}{2}$ -inch leading-edge cap with epoxy.

To install the NACA Droops, notch the L.E. as indicated on the plans, and glue in the W-17 former. The bottom edge of W-17 should be *parallel to the wing chord line*. Trim to length and Zap into place another $\frac{3}{8} \times \frac{1}{2}$ -inch balsa cap. A piece of CF.014 is inserted into the wing-tip T.E. slot and Zapped.

The molded carbon-fiber aft-wing mount cap faces the bottom of the wing. Sand the surfaces of the spar that are to accept glue. (Use E-POX-E filled with milled fiber to glue this part in the model.) Be sure it's 90 degrees to the top rib when viewed from the top and end. The T.E. cap is applied with E-POX-E at the same time. The center of the $\frac{1}{4}$ -inch hole should be 1 inch from the root rib.

After completing flaperon preparation, lay out the landing gear and servo access on the bottom of the wing and remove the skin with a sharp No. 11 blade. Clean up the edges with sanding tools, then install the $\frac{1}{64}$ -inch wheel-well liners and trim flush with skin. The molded flex-plates have cored holes for Violett retracts, and adapter plates are included for other retract styles.

Do not add fillers or in any way glue the flex-plates to the skin.

Slot and trial-fit the hinges and install the plywood control horn; mount flush with the bottom skin. Recess the control-horn

base in the ply mount for a cleaner installation; double-check that there's enough deflection for the flaperons to work properly. I covered the flaperon access with thin fiberglass sheet and painted it to match.

● **Stabilizer:** Add all structural pieces to the

foam cores and prepare the skins, which should be lightly block-sanded with No. 220 paper. Like the wings, the stabs are skinned using Loctite Spray Adhesive. Trim and block-sand the edges, glue on the L.E. and tips, and spot-glue the elevators into place (except where the plans indicate that they're permanently attached).

After joining the wing panel and mounting the assembly to the fuselage, the LEXs are installed. They're made of $\frac{1}{64}$ -inch ply with C.F. .014 strips Zapped inside for rigidity. The instructions adequately discuss installation. Two layers of masking tape are temporarily applied to the fuselage to space the LEX that distance from it. This allows for paint build-up and wing removal. The stab, fin and rudder are attached, and linkages are run at this time.

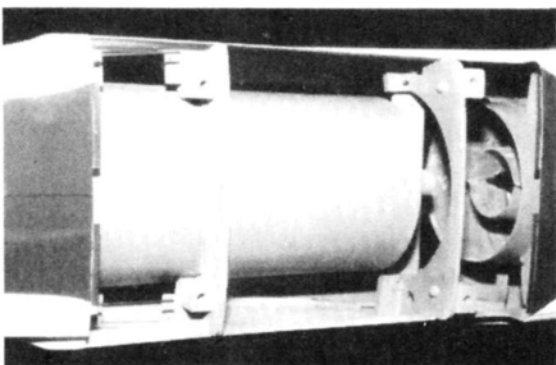
The fin is factory-built in molds from a balsa and carbon-fiber structure. Its mounting is *very important* to the safety and survival of this jet, so care must be taken to make sure it's secure. Grind lightening holes in the fin base rib and fuse to assist glue bonding. Use 30-Minute E-POX-E with milled fiber to glue the fin into place. View from the front and rear to make sure it's straight.

Before installing the tail tubes, paint the aft inside fuse, the formers, and the outside of the tubes with a brushed coat of K&B* Epoxy paint.

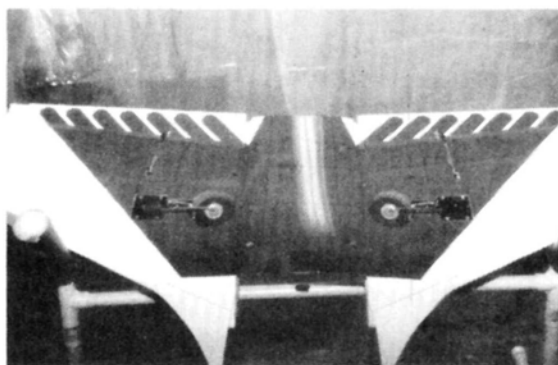
The nose gear is installed on a flex-plate that's bolted to a piece of CF 250 cross-mounted in fuselage forward section. The exact

position of this assembly is determined by the brand of landing gear chosen.

● **Finishing:** An application of Bob Violett Models Pin Hole Filler was applied to the epoxerglass components before the primer coat. This product applies like a paste wax and is allowed to dry before removal with a paper towel. Any residual filler is left in the pin
(Continued on page 67)



Underside view of fuselage with wing removed. Inlet duct is at right side of photo, thrust tube at center.



Underside of wing shows retract installation, "Thunderbird" paint motif, and LEX attached to wing surface.

World's Fastest Ducted Fan Jet?

by RICH URAVITCH



WAY OUT WEST, in a laid-back place called California, on the safe side of the San Andreas fault, there lies a huge expanse of desert that was once called Muroc Dry Lake. Back then, some really incredible feats in aviation were accomplished, like the fat, little, pumpkin-colored Bell X-1 exceeding the speed of sound with ol' Mr. Right Stuff, Chuck Yeager, doing the driving. Subsequent years saw a name change to Edwards Air Force Base and the presence of virtually

every new jet airplane that Uncle Sam even thought about buying. Everything from the F (then "P")-80 Shooting Star through the B-1 bomber started its test program there. The B-2 stealth bomber recently rolled out of Northrop's Palmdale facility (just down the road from Edwards), and it, too, will be making its first flight from this home of the Air Force Flight Test Center.

Testing means evaluating, quantifying, sorting out data and accurately measuring

parameters. To do this requires the best, most precise equipment available, and Edwards has it all. It's therefore significant that we taxpayers (or one of us, anyway) actually got to use what we paid for. Ron Gilman works at the base and is also a model builder/flier of note. He prevailed upon the government to allow him to clock his Bob Violett Models' Aggressor at the speed-timing track at North Rodgers Lake Bed. No hand-held radar guns or stop watches here, folks: This was the real stuff!

On August 8, 1987, his model, with its Violett/KBV .72 power package, was clocked at a two-way average of 173.10mph over a 200-meter course. (This was with a straight and level, 100-meter entry.) Quite an accomplishment; and it took place over a year and a half ago!

The quest for speed has always been one of man's desires, and that becomes evident when you look at the many records set at Edwards. It's fitting, then, that the fastest ducted-fan R/C jet gained its title at that very place. Some records are fleeting; this one, recorded as it was, will probably stand for some time. ■

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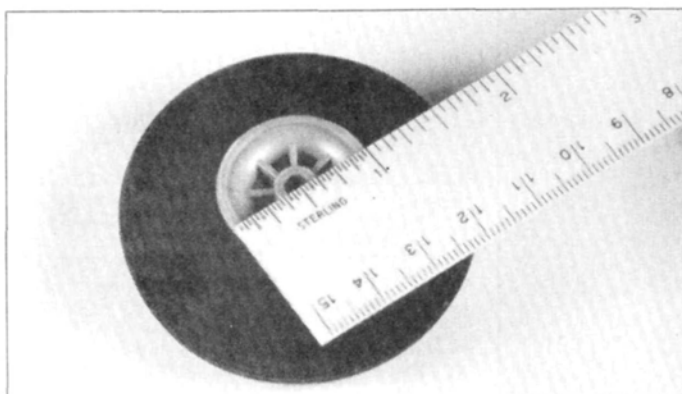
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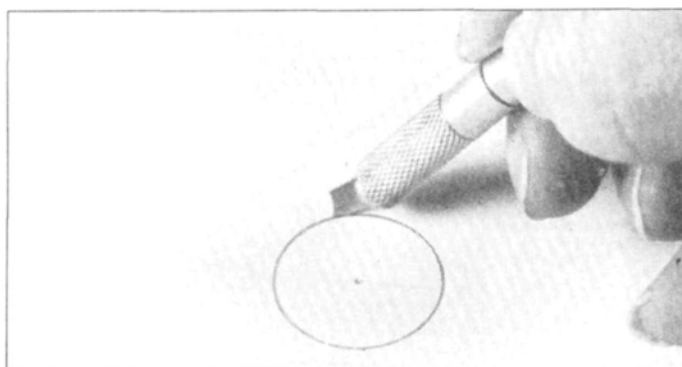
by RANDY RANDOLPH

PAINT WHEEL HUBS

Almost all the popular wheels sold for models have gray or silver plastic hubs. Those colors look OK with most models, but wheels that match the color of the airplane look a whole lot better! The photos show an easy way to paint wheel hubs, and it doesn't require a rock-steady hand.



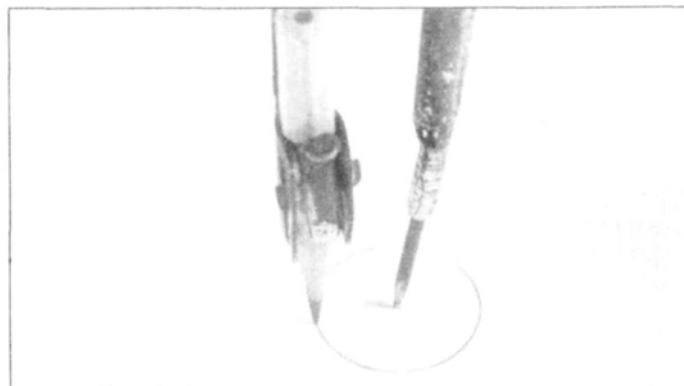
1. First, measure the diameter of the hub. Within certain ranges, the hub sizes are the same for different wheel diameters, but it's better to measure and be sure.



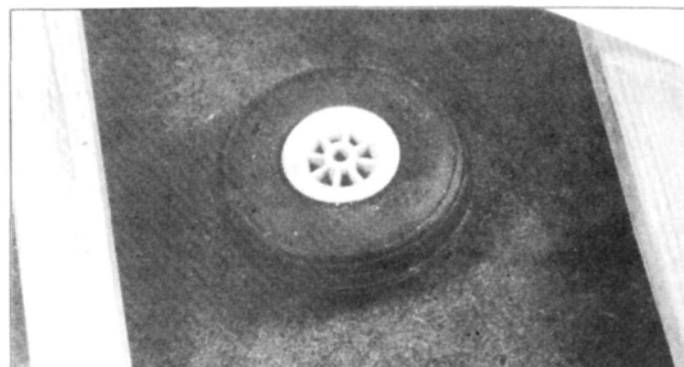
3. Make a stencil by cutting out the paper circle you've drawn. Don't leave any notches or slivers around the hole.



5. Center the stencil over the wheel hub, and hold it in place with two more pieces of wood. Hold the spray can about 1 foot above the paper, and spray lightly in a small circle around the hole in the stencil.



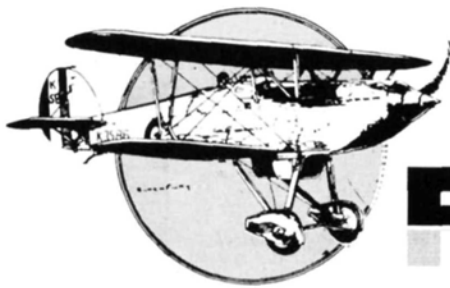
2. Use a compass to draw a circle of the same diameter as the wheel hub in the middle of an 8 1/2 x 11-inch piece of paper.



4. Place the wheel between two pieces of wood that are about the same thickness as the wheel. Three-quarter-inch material will match most of the more popular wheel sizes.



6. The finished wheel will look as if it were manufactured just for your airplane. For the best results, clean the wheel thoroughly before painting. Don't forget; there are two sides to every hub!



Fifty Years Ago..

by LYNNE SEWELL



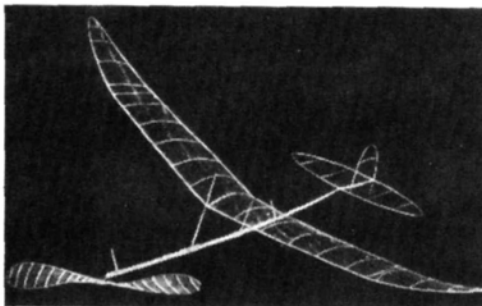
"CAN'T YOU GET it started?" Is this the world's most irritating question, or what? Since modelers heard it just as often in 1939 as they do today, Julius Unrath's "What Makes it Run?" was probably one of the first articles that readers of the April '39 issue of *MAN* turned to. Recognizing that his opinion might not make him too popular, Unrath nevertheless asserted that engine manufacturers weren't always to blame, and that, in most cases, "the model builder is at fault" when a stubborn engine plays possum. No doubt, his thorough explanation of the workings of the 2-stroke helped many keep down their blood pressure. But was he being especially magnanimous in asserting that "The sudden change from rubber to gas power may really be the reason..." for modelers' difficulties? Coping with a new technology naturally involves some initial frustrations, and the move from rubber bands to tiny temperamental engines obviously wasn't too easy. But what's *your* excuse?!

"Older" technology was amply illustrated in the article by Hewitt Phillips on the "stick model that captured the Stout

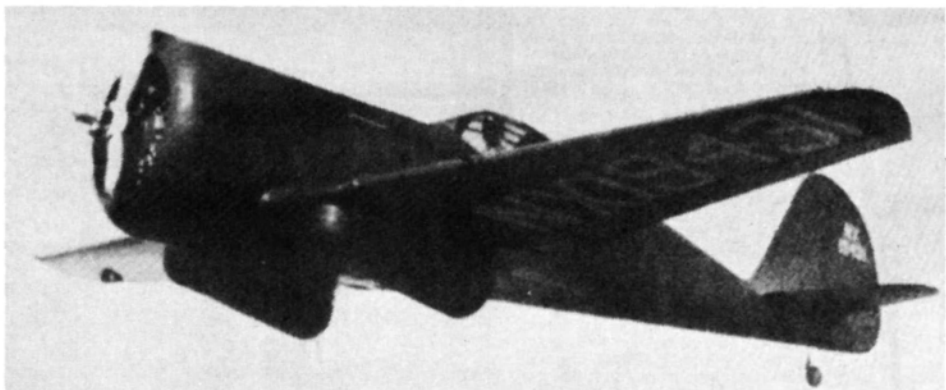
Indoor Trophy at the 1938 National Contest." Looking like a graceful dragonfly, the rubber-powered model was designed to combine lightness with strength and stability, and lightweight tungsten wire was used to increase the rigidity of the wings. With a weight of just .061 ounces, for its winning flight of 21 minutes, 53 seconds it was equipped with a microfilm propeller weighing only .011 ounce. Modelers were exhorted to "keep the cat away from the microfilm!"

For pioneers who were prepared to subject their nervous systems to the vagaries of gas powerplants, Arthur Kronfelt's article gave ample instruction on how to make a scale model of the WW I SE-5. Claiming it to be "one of the few biplanes that will fly well," the author/

In "How to Make Your Model Behave," Editor Charles Hampson Grant cautioned readers that competitions aren't always won by the finest model, and that flier technique "has a great deal to do with the success of the flight." His advice is often echoed by our authors now, so his article wouldn't be out of place in *this* issue. A clever modeler should strive to produce a plane "that will fly itself," he said. "Set the control surfaces correctly before each flight." A letter he'd received from a reader contained the usual modeler's lament: I carefully built a model from a kit; it looks great, so why won't it fly properly? Sound familiar? The editor had an answer (as editors always do!): "The answer lies in knowing the correct adjustment of wing, stabilizer and fin, and the



Left: The completed, superlight, Stout Trophy winner. Note the braced motor stick and wing. Even the prop is microfilm-covered!



Below: The U.S. Army's first interceptor: the Curtiss Wright CW-21.

designer said the 48-inch-span model weighed just over 3 pounds and should "be covered with China silk or light bamboo paper." Powered by a Cyclone "D," its wings were "demountable" so that it could be easily carried, and Mr. Kronfelt recommended that a glide-test be made before trying to fly it.

proper position of the center of gravity of the particular model."

Advice given by the anonymous "Instructor" (did he go on to become the "Gong Show's" unknown comic?) is also just as relevant now as it was then: "How about new club members?...Who's to help them?...*You!* Be patient and don't

criticize. They know little of the technique of winding a rubber motor. With them, it's either too many or too few turns." If newcomers were confused by rubber bands *then*, they'll obviously really appreciate your help *now* with those things that won't start.

If the Marshfield Gas Model Club sent us news of their exploits today, they'd be a shoo-in for our "Club of the Month." This group of young men decided they'd like to build a plane, so they organized a club, paid weekly dues of 25 cents and saved the money until they had enough to buy a plane. Then they saved for a motor, and by April '39 they were working on their second project—a biplane. Can anyone out there beat *that*!

"sudden, unannounced assault by enemy air raiders." With its ability to climb at 1 mile a minute, its pilots would force enemy bombers higher and so hamper their effectiveness. It was a "flying machine stripped for action."

"Flash News" gave ample reason to welcome the advent of any superior air power: "From an unimpeachable source far removed from the cancerous effect of insidious propaganda, we have received confidential information...that Germany has NINE THOUSAND fighting airplanes! With this news must come the realization that Germany has no fear of any nation...and that Herr Hitler will not be stopped by threats of retribution." Strong stuff! In fact, although it was the



The determined members of the Marshfield Gas Model Club and their communal plane!

The "Air Ways" column brought news from far afield, including information on an interesting plane that flew at the German National Model Contest. Hans Meier sent a photograph of an ornithopter—or, to be precise, a glider with ornithopter propulsion. This had small wings at the front that propelled it by flapping up and down, and the craft was apparently very stable. Of course, you all have one!

The cover of the April '39 issue showed the Curtiss-Wright CW-21 interceptor fighter, a plane that had been jealously guarded through three years of development and, as "the fastest-climbing, hardest-hitting fighter on earth" had been designed to assuage America's fear of a

year in which Igor Sikorsky constructed the first helicopter and Edwin H. Armstrong invented frequency modulation (FM) *fear* was the motivating force behind the boom in research and development. On April 14, President Roosevelt wrote to Hitler for assurances that there would be no further German invasions of the countries in Europe. We all know Hitler's answer!

On the bright side: The very first baseball game was televised, moviegoers flocked to see "Gone With the Wind," and "God Bless America" was one of the year's top songs. Ah well,...tomorrow is another day! ■

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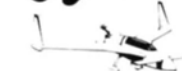
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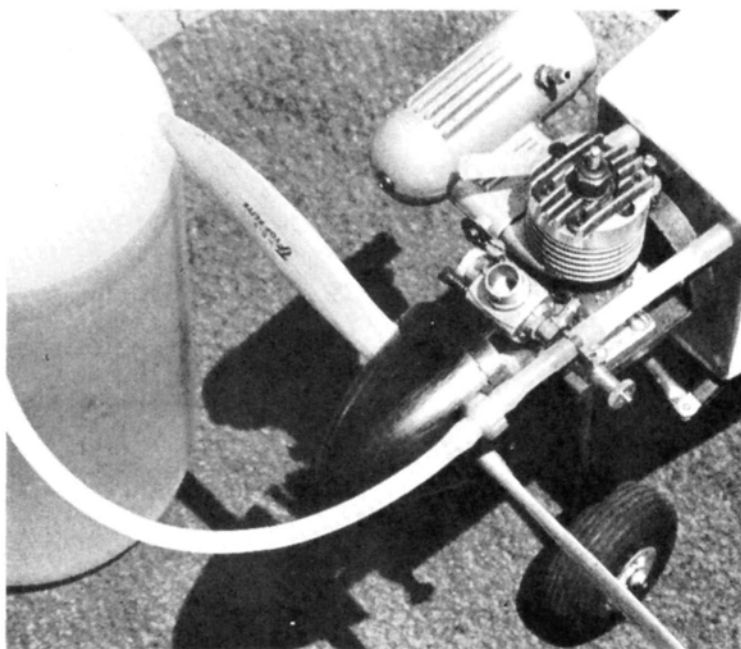
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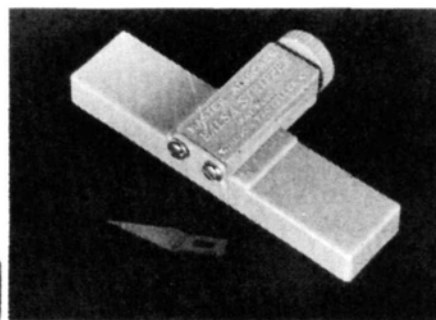
Basics of Radio Control

by RANDY RANDOLPH

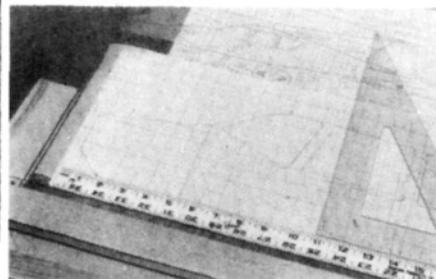
" OLD STUFF "



Since most flying fields are not carpeted, why not bring your own!



An adjustable balsa stripper will pay for itself in a very short time.



Plans can be enlarged; this is one way.

WHILE IN THE PROCESS of a rather exhaustive study of airplane transmitters, our new AMA District Vice President discovered something very interesting: Transmitters sold 10, 15 and even 20 years ago (mostly AM and American made) were well within the so-called "narrow band" guidelines established by the AMA, while most imported transmitters sold since the late '70s were not! It's time for more American manufacturers to get back in the R/C business with their "old" designs.

One of the best ways to make a new engine old is to run it in a dusty, dirty environment. Our poor engines are subjected to wear when they're started over dusty ground. To protect the engine from dust, place a piece of carpet under the airplane as it's being fueled. While the en-

gine is running on the ground, the propeller creates a whirlwind of dust that moves toward the engine and can be sucked into the air intake. Air cleaners that cover the air intake work very well, but few people use them, because they make it difficult to choke or prime the engine. The next-best thing is the piece of carpet, placed fuzzy side down between the engine and the dirt.

Since sanding creates a lot of dust, a sanding booth with an exhaust fan and dust collector would be great, but they're expensive. An alternative is an air-conditioner filter taped to the back of a box fan. While sanding, run the fan on the bench with the filter facing the sanding job. The filter will collect most of the sanding dust before it reaches the fan blades and your lungs. This fan-filter system also works

fairly well for those who are allergic to the superglues. There's only one drawback—it's a little cold in an unheated shop in the winter!

Sandpaper is also old, but it shouldn't be used on balsa or, for that matter, on any other type of wood we use in modeling. Sandpaper always leaves a part of itself in the work! Use garnet paper or even better, aluminum oxide paper, which is a little more expensive, but lasts longer.

The balsa stripper in the photo isn't old, but it's included with old things because strippers have been around as long as there has been wood to strip. Balsa strips are available in many sizes, but, when it's important to have two identical strips, it's difficult to pick them out of a big bundle. Enter the stripper: If wing spars or fuse-

(Continued on page 82)

by BUDD DAVISSON

A LOOK AT SOME ULTIMATE PERSONAL HOT-RODS.

JETS

STANDING ON THE HARD, black surface of the main warbird taxiway at Oshkosh last year, I'm sure one thought kept going through the minds of those in the crowd: "Only in America!" As far as the eye could see, retired military birds of every description filled the landscape. This must be the only place where so many civilians collect warriors from past wars, but it has been going on for so long that we've almost become accustomed to seeing men in Izod shirts and ladies in jumpsuits driving fighters. This year, however,

when Jim Robinson's F-104 taxied in, we all knew that a new high in individual freedom had been reached. Only in America would you see a civilian-owned and flown, Mach 2, manned *missile*!

Robinson's mechanical entourage made a lot of waves at Oshkosh '88. Let's face it: It's hard to ignore an F-104 parked next to a superbly detailed F-86, which was next to a beautiful MiG-15, which was keeping company with a Hawker Hunter! This one-man kerosene airforce *could* have been misconstrued as being a minor aberration that existed only because its owner is a Texan. Wrong! Robinson's Houston-based airforce represents the latest and most spec-

Beautiful, Chinese-built MiG-15 is owned by Paul Entrekin. One of a number of Soviet Korean-era fighters currently operating or under restoration in the U.S.





Not exactly a "warbird," but nowhere near as expensive to operate, is the BD-5J. This example was flown by Ed Johnson and kept airborne by the Bud folks.

tacular addition to what is a rapidly expanding turbine part of the warbird scene. Jets are coming on strong, and only the FAA's restraints will prevent them from soon being the most numerous of the warbird community (trainers notwithstanding).

The types and sources of the jet airplanes being bought by warbird enthusiasts show Americans' individuality and tenacity. Nobody thinks twice about putting a T-33 or an F-86 in the air, and the number of MiGs, Venoms and others now flying shows that Americans love a challenge. Who cares that only a few months earlier the Sabre had been sitting on a pole in front of a National Guard hangar, or that the late-model MiG, when finished, could challenge many modern fighters in a good dog flight?

Contemporary warbird restorers cut their teeth on Mustangs and Corsairs, and, as the supply of those airplanes began to dry up, they found themselves breathing life into airplanes they would have considered junk only a few years earlier. As they got better, they got braver and more ambitious, and they attempted bigger

and bigger projects. How about Bob Collin's B-24 being rebuilt by Tom Reilly in Kissimmee, FL, or Kermit Week's B-29 restoration project? We're talking serious resto projects, especially since the B-24 must have every single rivet replaced because of corrosion. They used over 400 pounds of rivets just making the center section and parts of the fuselage presentable. *Four hundred pounds!*



Reno racer Steve Hinton (of Red Baron fame) flies this ex-Peruvian A.F. F-86F Sabre equipped with Smokewinder smoke generators for demo work.

PHOTOS BY BUDD DAVISSON

JETS

Today's restorer is rehabilitating WW II airplanes that, except for the identifying data plate, are nothing. They're almost building new airplanes using the old ones as patterns. For that reason, the jets are duck soup. Imagine their feelings when opening the engine panels on an ex-Indian MiG-17 that had been flying only a few years earlier. The metal is fresh, the plumbing intact and the technology modern (more or less). The process is one of overhauling, not restoring, and there's a gigantic difference.

Although the jets offer a much higher performance, they are, in fact, simpler in some ways than the earlier machines. For instance, "complexity" is almost a synonym for the Rolls-Royce/Packard Merlin V-12. Built like a giant, 1400-horse Swiss watch, the Merlin, found in Mustangs and Spitfires, is a scary combination of parts that love to destroy one another and that absolutely demand *constant* TLC. A Merlin makes one of the highest demands for maintenance and, although its song is sweet, it's a prima donna to which attention must constantly be given. A jet engine, although equally precise, is much less complicated and demanding.

Jet restorers also love the fact that most of their mounts were used until fairly recently. Many third-world countries (and a bunch of second-world and a few firsts) jumped on that first couple of generations of jet fighters and



Above: Vintage Korean fighters like this Grumman F9F Panther are even more difficult to find and restore because they've long been out of service with ANY country. This example is flawless.

Above Middle: This T-38 Talon is owned by Californian Chuck Thornton and is probably the newest of the "surplus" jets. Built from multiple T-38 wrecks, this restoration is better than most of the "White Mice" currently in the operational Air Force inventory.



continued to fly them until last Wednesday or Thursday. The Soviet Bloc countries have had all the MiG variants parked on their flight lines from the early '50s to this very day. The Korean War-vintage -15, the later -17 and the much-feared -19 are in plentiful supply and are coming into the U.S. in amazing numbers ("amazing" being defined as several dozen). If that isn't enough, the Chinese MiG-21 is now finding its way into the country. (That's another high-Mach machine those at the local EAA fly-in will get a kick out of.)

The second generation of foreign jets—those contemporary with the post-Korean versions of the F-86—present some of the best combinations of "maintainability," "flyability" and blow-your-doors-off performance, and we're seeing increasing numbers of them at fly-ins and air shows. A sizeable number of two-place Vampires came into the country in the '70s and then sat around rusting and rotting (their fuselages are formed plywood).

The really early U.S. jets are even rarer than most WW I biplanes.



Because of its relative simplicity and "economy" of operation, the Fouga Magister is finding favor among the warbird fans who prefer jets. Ex-French trainer.



Most of them have now been rehabbed and are in the air. The Sea Venom, a hooked version of one of the Brits' better fighters of the '50s, is regularly coming in through Dean Martin in Manchester, NH. The new pilot/owners say the Sea Venom is a lovely, civilized machine that takes them cross-country at 600mph without even breathing hard.

What are some of the other interesting projects that have either been finished or are close to flying? In the restoration shops around the country, there are a couple of A-4 Skyhawks, a half-dozen F-8 Crusaders, a British Lightning, a ton of the little Hispano jet trainers and at least two Swedish SAAB Draken double-delta Mach-busters. The delightful little Folland Gnat has at least a half-dozen representatives on our shores, and the graceful, butterfly-tailed Fouga Magister is also making its mark. Last, but certainly not least, as was bound to happen, someone in the Viet Nam generation finally hit the big time, and the first civilian

This DeHavilland Venom hauls Robb Satterfield around in fine style. The slick black fighter saw service with the Swiss Air Force and is now probably in better-than-new shape!

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JETS



Ex-French Navy Morane Saulnier Paris I flown by Alan Preston typifies the level of perfection sought in jet restorations.

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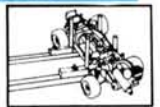
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Phantom is reportedly being pieced together.

Foreign iron figures so prominently in the jet generation because U.S. military airplanes are never sold to civilians in even a *remotely* flyable condition. Even the ones put on display in parks and on poles are generally "demilled" by cutting the spars. So almost any U.S. jet being restored is being put together from pieces scrounged from scrapyards where mangled wrecks were sold by the pound to be converted into beer cans. A second source is the overseas market, where airplanes formerly sold to foreign governments are being returned to our shores. (Robinson's F-104 is one of these.)

Oddly, restoring many of the jets is far less expensive than redoing a WW II veteran. The market values of most of the birds from the second big shootout are skyrocketing. A Mustang for instance, could be bought for less than \$20,000 in 1970, \$100,000 in 1980 and \$300,000 today. Today, a Mustang "kit" (a bare, basic airframe missing all the goodies, like engine, radiators, hardware, etc.) is priced at \$150,000. Going fast suddenly became very expensive. Jets are where the big recips were 20 years ago. Of course, doing a complete nuts-and-bolts restoration on something like an F9F-2 Panther can cost as much as doing the same thing to a Mustang: about \$500,000. Still, most of the jets are selling for well under \$200,000, and many are under the \$100,000 mark. Such a bargain! Makes you want to cash in your Futabas and run out and buy several jets, doesn't it? You're right; \$100,000 ain't potato chips, but to some folks, that's a *bargain* warbird.

And now for the bad news: Even as I

write, the government is paying several companies to scour the world for jet fighters to be converted into pilotless drones for *target practice*. Last year, they nearly brought in the world's entire supply of F-86 Sabre Jets, and having proven the effectiveness of heat-seeking missiles, these beauties are now descending from the sky in smoking pieces. The F-100s are going the same route, and it's rumored that some of the MiGs—notably the -21s—will suffer the same fate.

The early U.S. jets are among the rarest airplanes in the world; in fact, the *really* early jets (the Banshees, FH Phantoms, Furies, etc., of the '40s) are the rarest airplanes in the world—even rarer than most WW I airplanes. In less than 10 years, we'll be asking why someone didn't show enough forethought to save more of the F-86s, the -100s and others now being blown to bits. It would be easy to say that the *next* generation of aviation enthusiasts will dig the old jets out of the jungles and trash heaps just as this generation is now doing with Mustangs, etc. But it won't be the *next* generation; it will be later on in *this* generation. Taxpayer's dollars are being used to wage war on our own aeronautical history simply because it's cheaper to drone a Sabre than field a new drone. The trade-off doesn't seem worth it.

The future of the civilian jet movement lies in the hands of the FAA and, to a lesser extent, the insurance companies. The FAA is trying to tread the fine line between common sense and bureaucratic overkill. Although it varies from region to region (the FAA is organized in a number of regions, each of which is au-

(Continued on page 84)

SOUTHWEST



FAN FLY

by RICH URAVITCH



PHOTOS BY RICH URAVITCH

THE PREMIER U.S. DUCTED-FAN GATHERING CONTINUES TO PROVIDE A FORUM FOR INFORMATION EXCHANGE



Above: One of the numerous Parkinson Regal Eagles on hand. This one finished in Israeli markings patterned after their F-15s. Highly visible.

Right: Byron BD-5J finished in attractive Bud Light scheme. Almost half the size (40 percent, actually) of the full-scale version pictured in Budd Davisson's Jets article elsewhere in this issue.



IF YOU HAD CONDUCTED a very successful Fan Fly for five years straight and participation was increasing, you'd probably be inclined to change very little. Pick a place in the Southwest where interest in ducted fans is high and the level of activity is growing, get a bunch of folks together for a weekend and call it a Fan Fly. That's the abbreviated

version of how this whole SWFF thing started—more or less. When I attended the first one six years ago, it was held in Texas, in a little town called Lockhart, which isn't that far from Austin (which, not coincidentally, is home to most of the "fathers" of the event). It was originally held in mid-June and, as any full-blooded

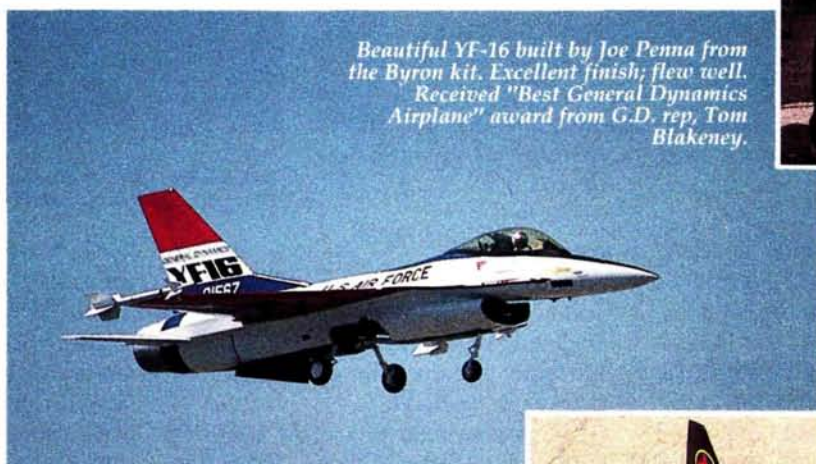


Mike Kulczyk brought his latest project, an F-105D Thunderchief. Scratch-built and Viojet-powered, the Thud has since been very successfully flown. Recipient of Loctite Corp's Best Scale Jet award.

Yankee quickly learns, this means *hot* in Texas. In the ensuing years, the meet moved around the area, touching down at Seguin and Houston and finally rolling into the chocks just north of Fort Worth at the Kenneth Copeland Ministries facility where it has been held for the last three years. Along the way, the date was moved to September, which, in the opinion of that Yankee mentioned earlier, *should* have made things about as perfect as they could be. Heat-wise, it did; the heat was a memory, replaced by high wind and rain on at least one day of the gathering. This year, the wind and rain teased us on opening day, but then went elsewhere, leaving us with the best model flying conditions ever.

Dawn Buckley and Ed Couch shared the CD chores for another year (they seem almost to enjoy it now!). They did a great job and had the help of the Mid-Cities R/C Club, which kept things moving smoothly. During the weekend, it became quite apparent that the "fun fly" atmosphere was being enjoyed by the many participants: Fly when you feel like it, shoot the breeze when you want to, and just treat yourself to some no-pressure, relaxing, jet modeling activities.

Most of the fan manufacturers were on hand, either personally, or by way of representation. The fun fly atmosphere extended even to these people, as manufacturers exchanged information with inter-



Beautiful YF-16 built by Joe Penna from the Byron kit. Excellent finish; flew well. Received "Best General Dynamics Airplane" award from G.D. rep, Tom Blakeney.

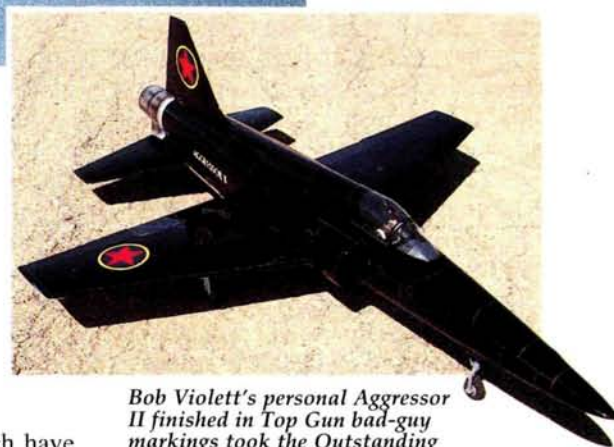


The MAN Jet Blast Technical Achievement award was presented to Dennis Crooks (l.) for his wing-swingin' F-14 Tomcat from the forthcoming Yellow Aircraft kit.

ested enthusiasts. The Southwest Fan Fly has become notable for this aspect, which probably explains its growth in general attendance and participation over the years.

Of the 85 airplanes I counted, there were some exciting things we hadn't seen before, some returnees and, naturally, many kit designs, which have now become standard fare at many ducted-fan gatherings.

Among the new things that grabbed my attention were Steve Ellzey's ATF (Ad-



Bob Violett's personal Aggressor II finished in Top Gun bad-guy markings took the Outstanding Performance Award from RCM's "JetSetter," Rick Schafer.

SOUTHWEST FAN FLY

vanced Tactical Fighter), which seemed to have been patterned after some of the early artists' impressions of the F-22 or F-23. Of these two competitors, the successful candidate will eventually replace the F-15s of the USAF. Steve's model was a slick-looking, canard-configured delta, but unfortunately, it self-destructed before I could get a shot of it. It sounded like the canard started fluttering on one of the passes. I do hope Steve further develops



The omnipresent Harry Woods from Long Beach, CA, found a runway light with his Byron F-16. Harry has probably built a dozen of these birds (loves 'em!).



Dave Escobar's other F/A-18. Nice size, single-engine version designed by Dave. Great performer.



"Prize-winning" crash by Dave Escobar of his very pretty, scratch-built F/A-18 Hornet in Blue Angel livery (one of two he brought). Spectacular show-center impact; cause unknown.

the design, because it was quite unusual. Recipient of Loctite's "Best Scale Jet" award was Mat Kulczyk for his Republic F-105D Thunderchief. Last year, it was his D.H. Sea Vixen; the year before, a Gloster Meteor. Doesn't this guy ever build kits? Mike's Thud wasn't quite finished for the meet, but it has since flown a number of times. He recently sent me a video tape of the flight, and it looks great. About the only thing missing from the Viojett/O.S. 77-powered beauty was the scale inlet-duct whine. Rounding out the Republic family of Thundercraft were the A-10A Thunderbolt II and F-84F Thunderstreak built by CD Ed Couch. They too, have recently flown. The Thunderstreak was designed by Lynn McCauley, who also showed up with a new version of his F-104 Starfighter and a rebuilt version of his "Stealth" fighter, which has presented repeated aero problems during every attempt to fly it. Now that the Air Force has released photos of the "real" F-117A stealth fighter, can we expect Lynn

to model it??

First-time attendee George Miller from Custom R/C brought his F-8 Crusader and single-engine F-4 Phantom, which was frequently airborne with genial Col. Bob Thacker at the sticks.

The most swingin' time of the meet was enjoyed by Dennis Crooks, flying the variable-sweep F-14 by Yellow Aircraft. The airplane impressed *everyone* and became the recipient of our Technical Achievement Award.

No stranger to the Tomcat world (having built his own a while back) is Dave Escobar, who showed up with a pair of single-engine F-18 Hornets in Blue Angel markings. They flew great and looked super!

Violet-powered stuff was all over the place. When grouped for a photograph, they covered a significant part of the runway. Vipers, Aggressors and Sport Sharks everywhere—and one sole F-86F: Bob's own. Yup, it was there, and it's gorgeous. For all you guys who have been on line, it

looks like it was worth the wait. Bob received RCM's "Most Outstanding Performance" Award.

Steve Korney's Hurricane fans were propelling a number of machines, not the least of which was his own rapid sport jet, which he calls the Cobra. Although designed as a test vehicle for his fans, Steve said interest has been high enough to make him consider producing some kits.

As expected, there were a lot of Parkinson Regal Eagle and Byron F-16s on hand. The Eagles flew well and frequently—especially Joe Pasztor's, which seemed to be airborne *all* the time. Joe's flying was super, with the high/low altitude boundaries of his flights between 12 inches and 100 feet. Harry Woods, assisted by his involved wife, Noreen, had his Byron F-16s on hand, along with a scratch-built, tail-less Northrop X-4. I don't recall ever seeing this subject modeled before, and I admit to some concern over the model's ability to fly successfully (a view seemingly shared by others there).

Well, Harry came through, and the X-4 flew quite well, with none of the anticipated stability problems.

Of the Byron F-16s on hand, the prettiest, no doubt, was that built by Joe Penna. Finished as the "YF" prototype, it proved to be no hangar queen, getting airborne during the meet with Ed Couch handling the flying chores. Joe received the "Best General Dynamics Airplane" award for his efforts.



Tom Sewell's BVM Aggressor shortly after liftoff. White with blue NASA scheme is simple but attractive.

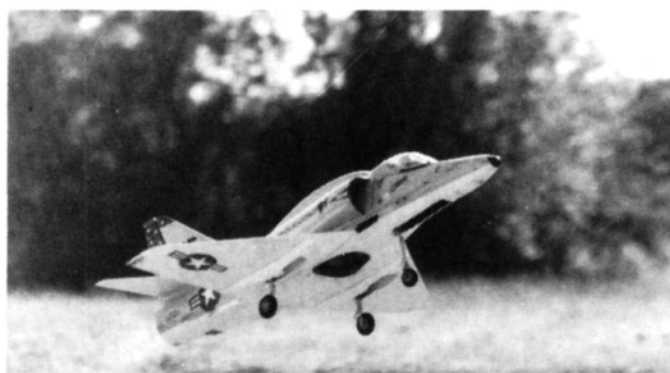
The Austin bunch—Mike Krizan, Russ Eppright, Bobby Zieger, Terry Wysong, Mike Kulczyk and Tom Sewell (the guys I mentioned earlier as being the "fathers" of this meet)—now seem content to show

up, party most of the time, and fly occasionally.

The flying portion of their routine this year seemed to include a series of "one-flight stands" that consumed one Sport



Dave Thompson's nicely finished ex-Sterner Engineering Sport Fan just before touchdown. Nick Ziroti Models has molds; might re-release revised kit.



A-4 Skyhawk built by Steve Hyek from the Byron Originals kit. Good flier.



Tom Perry seems to be pointing across the runway to the point where his KFIR C-2 would eventually smite the earth. In the foreground, Don Line tends to his Byron MiG-15.

Shark (or was it two?) and one BD-5. They were last heard arguing over who was going to claim the remaining visible parts of the wreckage! They obviously don't take the sport seriously enough!

One of the highlights of the affair was the two-hour tour of the nearby General Dynamics facility, where SWFF participants were given an opportunity to see how a full-size F-16 goes together. It's fascinating to watch an Electric Jet start as bunches of little pieces and emerge as a combat-ready fighter. It would take a huge box, but what a beautiful kit it would make!!

This year's event boasted 67 registered fliers. I counted 85 airplanes, plus a number of show-and-tell projects, which all seems to indicate that this meet will continue to be successful. Present word is that the 7th annual edition will take place around the same weekend in September at the same site. Mark your calendar, and plan to attend. It's a "good ol' get-together"!

by RICH URAVITCH

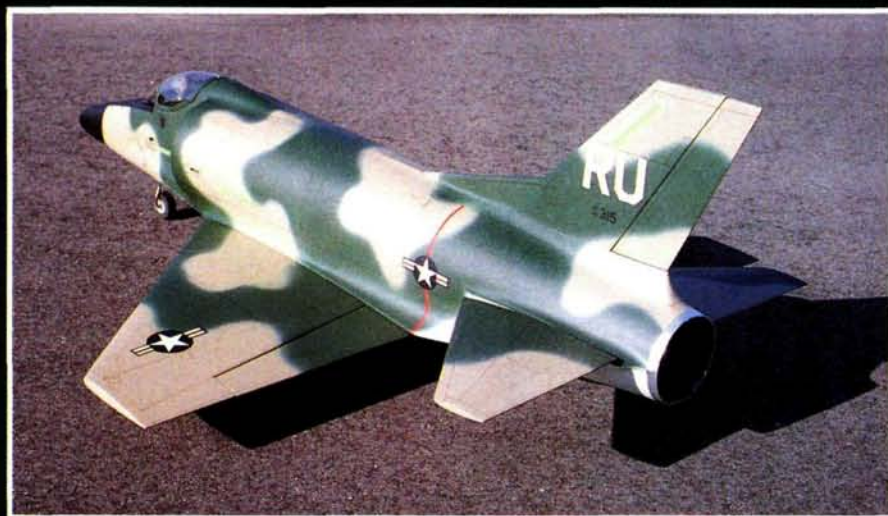
SO YOU'VE READ everything you could about this "new" form of aeromodeling called "ducted-fan jets"; it's got your interest, in addition to raising your pulse rate about 50 percent, and you're ready to take the plunge (poor choice of words, I guess!); OK, take to the air. You've done your homework and have concluded that you want an airplane that delivers good performance, won't bring a more personal feeling to the term "budget deficit," and most important, doesn't have to be a scale airplane that will consume huge chunks of time to finish and detail.

The newest jet kit from Byron Originals* might just

BULLET

This newest jet offering from Ida Grove represents their entry into the sport jet market.

be the ticket. The boys from Ida Grove have been at this ducted-fan game for a fair number of years, dating back to the days of their first jet kit, the MiG-15. This airplane was a decent performer even then, when some of the most powerful engines around were the performance iron like the O.S. 60 and the similar-sized Webra Blackhead. Tuned pipes were for the tinkerers, and ducted fans, in general, were for the experimenters. As the cigarette commercial used to say: "You've come a long way, baby!" The MiG has been so popular that it has been revised and re-released in a much improved form, and Byron has followed it up with



Although the Bullet isn't a scale model, the finish makes it look like any number of full-scale jet fighters.

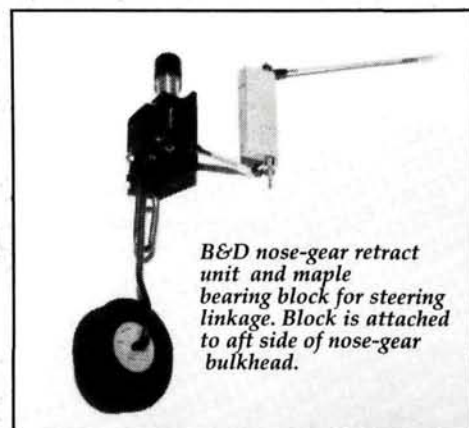
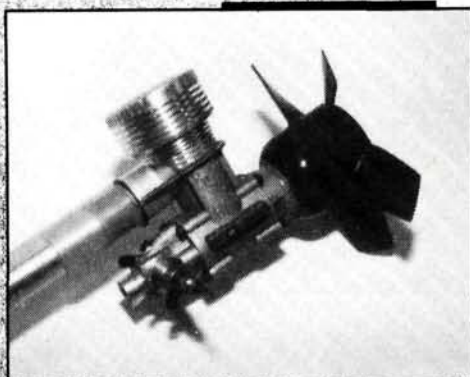


A Williams Brothers' pilot was suitably modified to become a jet jockey. Oxygen mask shaped from micro-balloons.

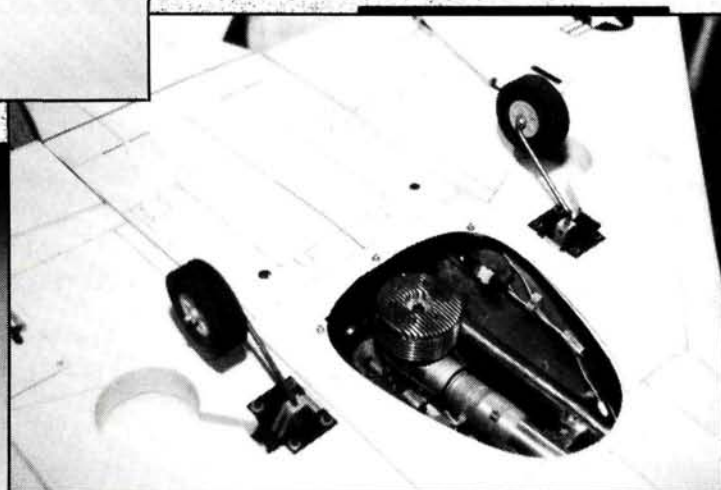


Above: With its camouflage scheme, the Bullet gives the impression of a typical Viet Nam era fighter on a fly-by.

We "settled" for a super-running Rossi .81 from our Skyhawk—kind of like "settling" for Donald Trump's bank account! Five-blade "Byrotor" shown installed.



B&D nose-gear retract unit and maple bearing block for steering linkage. Block is attached to aft side of nose-gear bulkhead.



Above: Bottom of fuselage shows Spring Air retract installation, along with Rossi .81/pipe-mounting detail. This isn't a "cheater hole"; three screws at rear edge secure fiberglass access cover. Inked panel lines add dimension.

Left: This is the engine we were going to use—the ultra-powerful Rossi .90. Unfortunately, it wouldn't fit with pipe. (See text.)

BULLET



Wing-root area shows connections for aileron servo and retract line. Slot is spar receptacle.

SPECIFICATIONS

Type: Ducted-fan sport jet

Wingspan: 42 inches

Length: 58 inches

Wing Area: 601 square inches

Weight: 156 ounces (9.75 pounds)

Wing Loading: 37.2 ounces per square foot

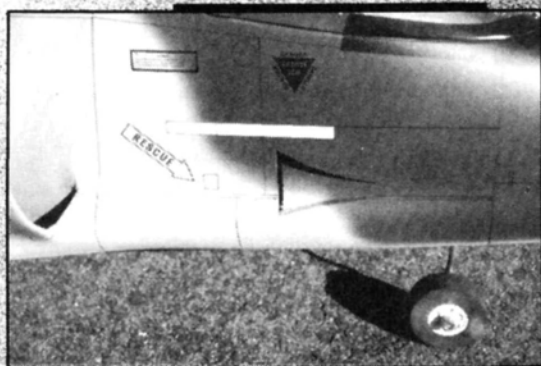
Power Required: .77 to .90, plus Byrojet fan unit

Number of Channels Required: 5

Suggested Retail Price: \$463.10 (includes fuel system)

Features: Fiberglass fuselage, Byrofoam wing and tail group, molded-in retract fittings, extensive hardware package, multi-sheet drawings, illustrated construction manual.

Comments: Potentially a good, non-scale sport jet. The kit is very complete and relatively easy to assemble, but in stock form, it has some difficulties that could have been "designed out" rather than retrofit.



NACA-type air scoop was added to lower fuselage side to aid in tuned-pipe cooling.

THE KIT: Let's take a look at what's in the kit. The fiberglass fuselage is laid up with cloth and polyester resin and is of high quality, displaying an absolute minimum of pesky pin holes. Your first impression might be that the material is too thin but, not to worry, it's more than adequate for the job. You'll be adding some bulkheads and reinforcement pieces, which stiffen things up real well. The molded Byrofoam parts, which include the wings, stabilators and vertical stabilizer, were equally well-done, and the budding jet driver should have no problem working with this material. All the required metal attachment and actuation bracketry, like the wing-blade spars, retract mounts and rod receptacles, are pre-molded into the structure. This eliminates some of the usual causes for major head scratching. No provision is made for fixed-gear installation but, since jets look ungainly with the gear down anyway, this was probably a wise design decision. There appears to be a lot of cross-utilization of parts within the Byron kit line

a number of new jets, including the A-4, F-16, BD-5J and others, up to an enormous, twin-engined F-15 Eagle. I guess these guys are convinced! The latest in the chain, as I said, is the Bullet.

My only other experience with building a Byron kit came with the "Field and Bench" I prepared on the A-4 Skyhawk for the October '83 issue of *MAN*. That review, plus talking to many other Byron kit builders at the various jet functions

I've covered around the country, pretty much prepared me for what to expect in the Bullet. When the kit was ordered, it was suggested that we team it up with the new Rossi .90 driving the proven Byrojet fan unit. Feeling that it would provide an ideal match and propel the Bullet "to the edge of the envelope," we gave the suggestion the OK—a decision that didn't anticipate the then-unknown complications. More about that later on.

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Molded of high-impact styrene, these dummy cylinders feature deep cooling fins for utmost realism. Both the Wasp and Whirlwind types of cylinders are available in two different large scales: 1/5th (2½" = 1') 1/4th (3" = 1')

Kits include assembly instructions. Smaller sizes are also offered.

Note: These units may be modified to resemble other cylinder types.

Send \$3 for full-color catalog, featuring aircraft paintings suitable for framing.

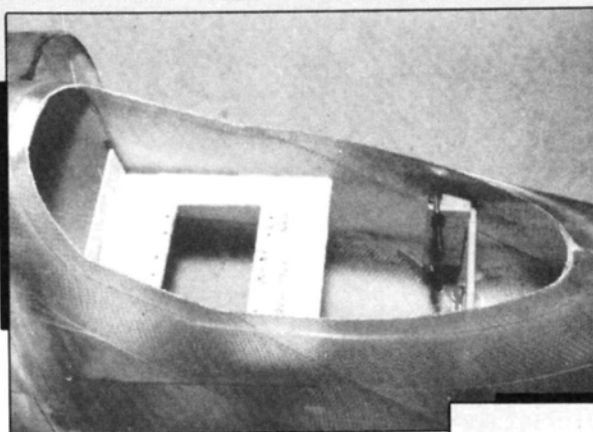
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DEPT. MAN



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BYRON BULLET



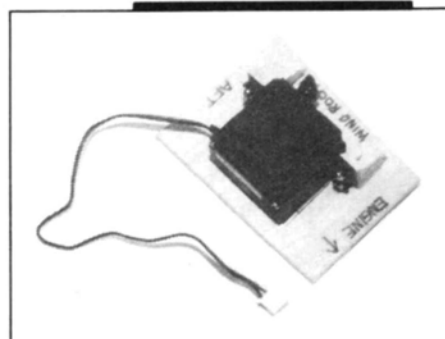
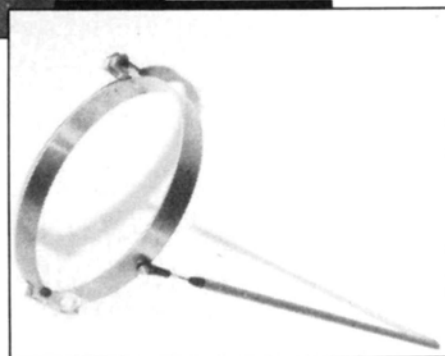
Left: Servo tray and nose-gear bulkhead. Good access through removable cockpit assembly. Nose-gear bulkhead in this position won't allow installation of Rossi .90/Byron pipe combination. (See text.)

because, as the Byron CAP provided the wings for the Pipe Dream, it looks as if the foam parts in the Bullet kit are derivative forms of the same pieces in their F-16.

The rest of the kit components include an array of vacuum-formed plastic pieces: the canopy and cockpit; a clear Lexan thrust tube; some plywood sheets (both die-cut and uncut); a set of well-done illustrations (which include detail as well as general position drawings); and a hardware package that would rival your local hobby shop's Du-Bro rack! This neat stuff is rounded out by a 20-page owner's manual that provides both assembly and operating instructions, along with parts lists and safety warnings.

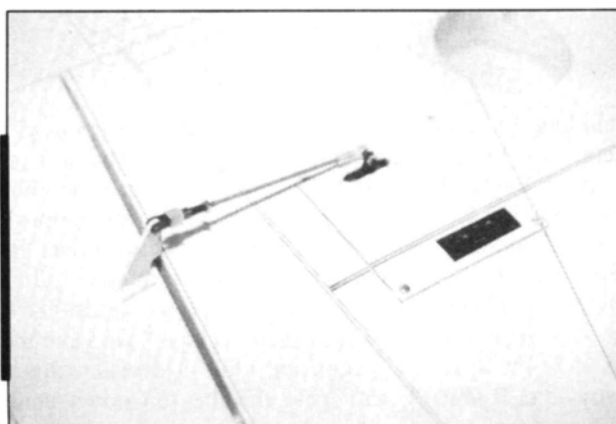
CONSTRUCTION: One would assume that, with all this assembly data, building time would approach light speed. Not so, folks! In fact, I found the instructions reasonably accurate in sequence, but frequently confusing in content. For example, a parts list is an excellent idea, but giving every part a number (six or seven

(Continued on page 46)



Above: This is the elevator servo mounted on its ply and maple plate. It becomes virtually inaccessible after installation, so choose a reliable unit.

Top: Hefty, 360-degree hoop is used for stabilator actuation. Welded block with compression screws allows stabilator assembly to be removed for transportation.



Roll control uses one servo per aileron, which is now generally accepted practice on many high-performance models. Eliminates any potential for sloppy linkage. Cover removes for access.



duke's mixture



Freebies available at this time are our new color catalog, new price sheets, and parts sheets for 1988 and 1989 model motors. We would appreciate receiving a self-addressed envelope with two stamps, however.

Effective January 1, 1989, all Fox motors (except the Combat) are supplied with mufflers.

For some time I have been using the "soft sell" approach in these columns. Many of our customers are more direct. Here are some excerpts from letters we have received.

Eric Larson, Pine Grove, CA — "Dear Fox Mfg., Yesterday I bought a Fox 40BB Deluxe. It was the first Fox engine I have owned. It was with some apprehension that I bought anything other than an O.S. engine, as I have been burned before buying off brand engines. Today, I am converted. The Fox 40 and my O.S. 40SF are similar in that they both start and idle magnificently and I can't tell any difference in their power. But that's where the similarities end. The Fox 40 vibrates less, is easier to adjust, is lighter, comes with a great spinner, costs half as much, and is American made. I have now made sure that everyone in my flying club knows what a great buy Fox engines are. THANK YOU FOR A QUALITY PRODUCT."

Eric Branham, Paris, IL — "After purchasing 40 Deluxe this year I am impressed. It performs exceptional (a lot better than O.S.). Are you planning to replace the Eagle III with an update 60 size? If so, you will be assured that I will be first in line to purchase."

Jon Armitage, Indiana, PA — "I wanted to send you a letter of praise about your motors. Your motors were all I used when I flew C/L and FF. When I started in RC about one year ago, I decided to try a Super Tiger 25, OS 4 Stroke 40, and they were good, but I came back to Fox. The power, quality, and handling all at a decent price. Your engines are the most popular at our field."

Will Sgarkat, Cape Cod, MA — "Just a note of thanks for all you've done for this wonderful hobby of ours — your fine engines, Duke's Mixture column, and the terrific service you offer to those of us who accidentally smash up Fox engines beyond what they'd care to tackle in repair."

Westley A. Keller, Gouster, OH — "Sir, I have been meaning to drop you a line for some time. The 40 motor I had trouble with that you replaced put the icing on the cake. I will never run anything on my planes unless it says Fox on the side. The performance and service says it all. On the subject of the Decals; at the present time I am running 8 Fox engines, so I am requesting Decals accordingly. Also, I am looking forward to the coming of the Eagle 4. Keep going with the best engines in the world."

Barry Doughty, Absecon, NJ — "I replaced an old OS Max 60 in my Clipped Wing Cub by Top Flite with your new Fox 50BB. WOW — what an engine, no vibration, started right out of the box with no adjustments. Idled good, acceleration from idle to full and back was terrific. Weight was the big factor purchasing the 50BBRC, which is lighter than OS, SuperTigre, Como, etc. Also must add, replacement parts are more economical than foreign imports. Coming in for landing the motor idled down beautifully and settled in for great landing. Again, this engine is something else, loads of power and very easy on fuel for a 50 size engine."

John Holder, O.D., Stevenson, AL — "This engine was obviously defective. Why else would it have pulled the wings off of my Aerostar 40? Seriously, I was very pleased with this, my first Fox engine."

Vaughn Kempf, Modern Hobbies, Miles City, MI — "Just wanted to take a few minutes and send a few words of praise your way. I talked three of my customers into buying the Fox 40BB Deluxe motors. We are all quite impressed with these motors, and have a couple of observations to pass along. First, we have found that

your performance figures seem to be a little conservative (modest)? We are measuring 14,000 plus with Master Airscrew 10 x 6 props, using a Royal Pro Tach for the readings. Idle is lower than any other 40 I've ever run, and reliable, even during spins, snaps, and inverted idling."

Kenneth Wilson, Schenectady, NY — "Want you to know that I am a loyal and satisfied Fox engine user, as over the years I've owned the U/C 36, many Fox R/C engines, such as the Fox 25, early Fox 40 and Eagle III. I currently own 2 Eagle IIIs. I must compliment you on the quality and value you've designed and built into Fox engines."

Corey Wills, Perryville, MO — "I wish to compliment you on having the finest engines made. Several of my friends and I have been flying Fox for the past three or four years, and I wouldn't give them up for any other engine. Even with the somewhat higher prices lately, they still can't be beat for affordability, reliability and performance."

Doc Matthews, Wichita, KS — "I just had to drop a note to express my pleasure over your engine (Fox 45). Excellent mid-range, easy to start and set, a super neat spinner set up (and finally a safe one), and most of all, incredible power."

Larry Maltman, Winnipeg, Canada — "Thank you kindly for so promptly and courteously filling my last order. I appreciate the excellent service. It seems that in today's hurried ways few businesses take the time to do what just seemed natural for Fox Mfg. Co. I have been an active builder/flyer since 1962. My first Fox engine was reliable and durable, and I am also happy to state that the additional 17 Fox engines I have purchased since 1962 are all running reliably and consistently."

Lester Goldsmith, Action Hobbies, Memphis, TN — "I am writing to tell you that the Fox 60 Heli Engine has cranked and run flawlessly right from the start. Enclosed are pictures of it in a Schluter Scout 60. I did test run the engine before installing it. I believe that was not really necessary because I just cranked a Fox 45 Heli today new and unrun (except by your factory) in a new Schluter Junior and it was as though I had test run it. It too cranked and ran immediately, idled perfectly and was very smooth. I believe the word is getting around that Fox is one of the best buys now because the compression is always good making starting good. The power output is always above average or tops, as confirmed by test articles in magazines. Life is always good because you do not appear to cut corners on important features, such as bushed conn rods and grades of material. Parts are always on hand and on tap and your factory service is unmatched anywhere."

Eugene Mathis, Daphne, AL — "Took your Fox 40BB out to the Club field last Saturday, kicked the tires and lit the fires and took off. I leaned it a bit and flight number two went the whole tank and really started to come in. Flight 3 was very spectacular; pulling vertical to do a stall turn, I finally had to throttle off as it hung on the prop and just kept going. A veritable hoss it is because the Kaos 40 weighs a ton."

Walter Pawlkanis, Oakhurst, NJ — "I don't normally write to manufacturers (or anyone else as far as that goes) matter of fact — I can't remember when I wrote last. However, I am really impressed with the Fox 40BB Deluxe. WOW — what an engine. I have mine mounted in a 40 size Ugly Stik type airplane, with about 2-1/2 gals of fuel though it so far. Eyes were popping when it started right up and required only some hi-speed adjustment. Since then until now it has gotten better and better. Vertical performance just doesn't quit — throttle response is so certain and sure that I'm willing to wager (bet money) on its certainty."

Al Mancini, Los Angeles, CA — "I salute and thank you for the incredibly fast turn around on my phone order. Onward and Upward."

Andy Keeley, Memphis, TN — "I bought an Eagle III and put it on a 6-1/2 pound airplane. The next day at the flying field I had great airplane with all the vertical performance I needed and more. Thank you for the great engine. I also like Duke's Mixture in Model Airplane News."

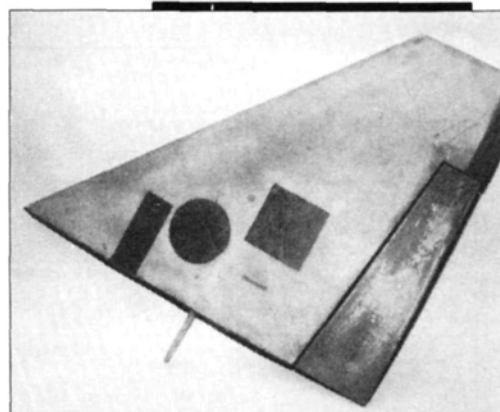
Happy Flying,

Duke Fox



Manufacturing Company
5305 Towson Avenue
Fort Smith, AR 72901
Phone (501) 646-1656

BYRON BULLET



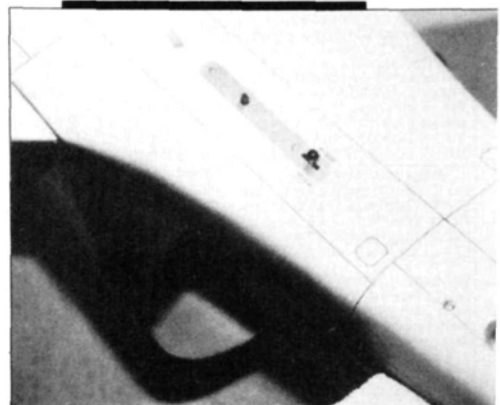
The "glassed" R.H. wing panel. Dark areas are ply sheet "plugs" used on upper surface only. Note molded-in aluminum blade spar protruding from root at mid-chord.

digits, at that!) is only valuable if the part isn't readily identifiable, or has the same number marked on it. Try marking a 2-56 hex nut with a number like 1430478! I can see it for inventory control at the manufacturer's plant, but it's unnecessary in a materials list. The real problem is that the numbers are used in the assembly text and serve no real purpose.

In spite of this, assembly moved along reasonably well with no major glitches. Some of the minor ones? The vertical-stab mounting block or "hard point" must be shaped from rectangular pine block. Its shape is semi-critical as, in addition to providing the only designed-in mount point for the vertical stab, it's also the termination point for the rudder "pull-pull" Nyrod installation, the geometry of which is less than ideal to begin with; so try to make it as "slop-free" as possible.

Since I didn't feel that having the fin removable for transportation (as provided in the instructions) was that important to me, I added an additional pine block that serves as a receptacle for the forward aluminum mounting tube on the fin. The fin

(Continued on page 99)

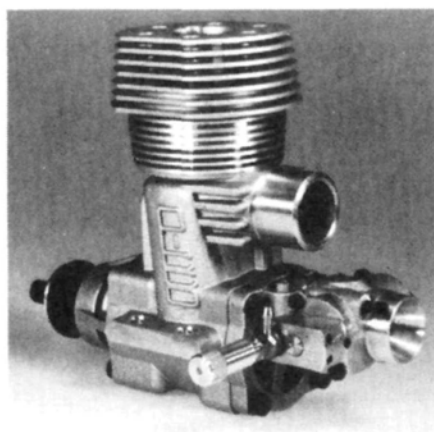


Lower forward fuselage shows "Sure-Flow" fuel-system valve installation. Seems to work all right, but install and plumb carefully!

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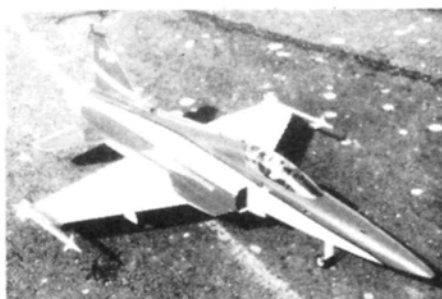


Picco .90 DF

Andes Hobbies
P.O. Box 3077
Laguna, CA 92654
(714) 582-5203
Picco DF engines

G. Bertella
Via Matteotti 248,
I-Gardone V.T. 25063
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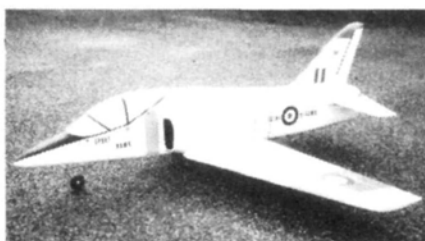
Violet F-86F

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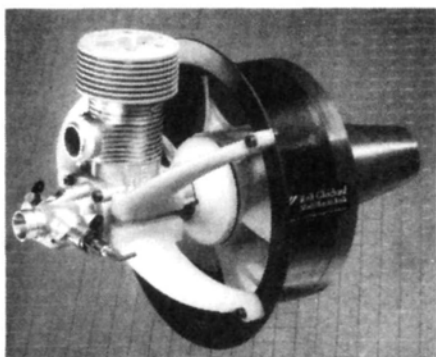
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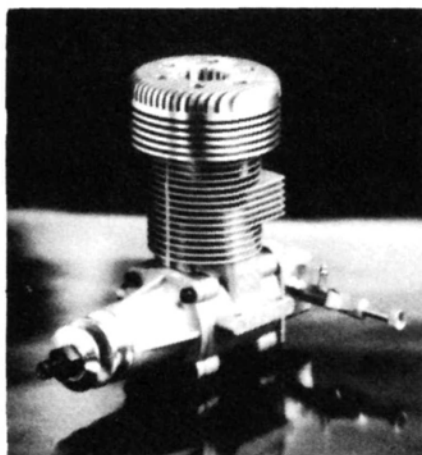
Zeppelinstrasse 12-14, D-7710
Donaueschingen,
WEST GERMANY
Fan units



Hobby Barn F-86 Sabre

Hobby Barn

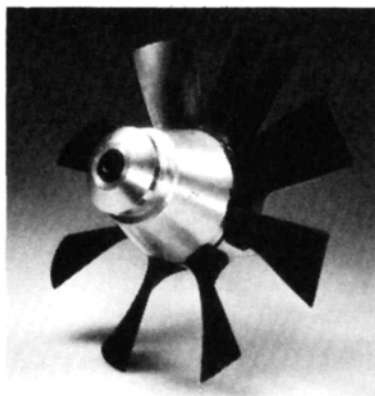
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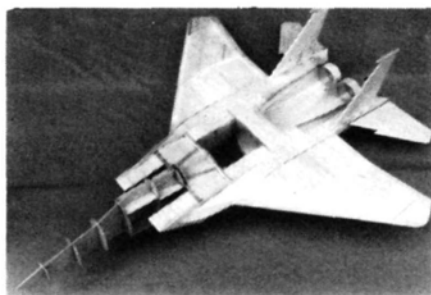
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Smithtown, NY 11787
(516) 234-5038
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Bob Parkinson Flying Models
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Thornton, Ontario
CANADA L0L 2M0
(705) 458-4391
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Paul's Flying Stuff
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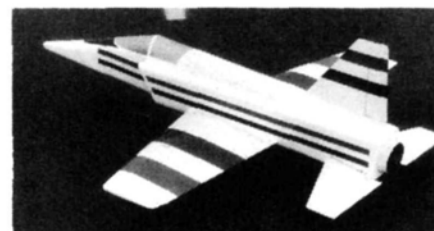
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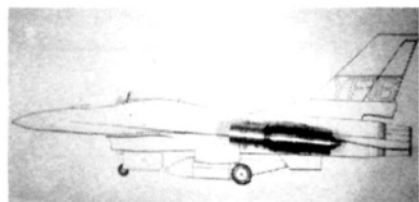


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Pacifica, CA 94044
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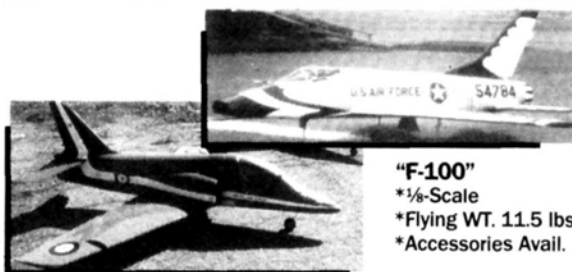
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Quiet Flight

by JOHN LUPPERGER

AS I WRITE THIS in the first week of January, the new contest season is just starting. Like most of you, I'm trying out a new bird, planning this year's contest calendar and trying to figure out how to win some events this year.

Soaring and the Nats

By now, I'm sure you've heard that the Nats will be held in the Tri-Cities area of Washington on July 15 through 23. I called Wil Byers (the organizer of the Mid-Columbia R/C Scale Fun Fly) to see if he had any inside information on the upcoming event, and he said that the soaring section of the Nats will be slightly different this year. They plan to hold different soaring events each day, rather than to mix them throughout the week. Monday would be Cross-Country and Slope Racing; Tuesday, Hand-Launch R/C and Slope Racing; Wednesday, Scale and F3B; Thursday, Unlimited; Friday, Standard Class; Saturday, 2-Meter; and Saturday



Cliff Hanger's new Corsair will be very popular with power scale slope fliers. In its booth, the company ran a video showing the model's impressive performance.

night, the awards and banquet. It's an interesting itinerary, and one that should make life easier for both officials and contestants. If it works, contestants will only have to worry about hauling one or two models to the field each day, instead of the usual four or five.

Wil also says that all the winches and retrievers will be new. It seems that the Nat's old winches weren't up to an acceptable standard for this year's Soaring organizers. It looks as though 1989 may be one of the best years in the last decade for Nats soaring enthusiasts.



Global Hobby Distributors displayed three new models from Sailplanes International at Hobby Shack's booth. The Osprey 100 is designed for thermal flying; the Sitar Special 100 for slope or thermal; and the Mini-Racer is an all-out aerobatic sloper.

Scale Slope Fun Fly

Last year's Mid Columbia R/C Scale Fun Fly in Richland, WA, was a roaring success, and this year's looks as though it will be even better. Wil Byers (organizer and CD) informs me that they expect to have somewhere between 100 to 150 aircraft present. This year, the event will also sport a new name: The 1989 International Scale R/C Soaring Fun Fly. The dates are May 26, 27 and 28, with the banquet on the evening of the 27, and entry costs \$30, which includes one raffle ticket and the banquet. Each additional model entered will cost an extra \$5 and will entitle the pilot to an additional raffle ticket. For additional information, call Wil at (509) 627-5224.

Wil sent me a home video of last year's event, and it was really impressive. Besides the usual scale glass ships, there were several vintage models, flying wings, power scale slopers, and the hit of the event—the Northrop Flying Wing. I don't have the specs on this model, but it's really *big* and really *impressive*! The flight shots are *unreal*. The model soared with ease and turned a high speed. I'll try to make this year's event, as I really want to see this model fly!

Astro Champs

The 15th Annual Astro Flight Championships will be held on June 17 and 18 at Fairview Regional Park in Costa Mesa, CA. Like last year, there will be four rounds of flying in four classes: 7-cell Sailplane and Old Timer, plus Unlimited Sailplane and Old Timer.

Astro Flight* and several other manufacturers support this event with prizes, and most contestants go home with something. The entry fee is only \$5 per class, and for more information you can call me (John Lupperger) at (714) 536-4973 after 6:00 p.m. Pacific time.



Although not true scale, DCU's Stryker should make power scale slope enthusiasts very happy. Model looks like a cross between an F-18 and a stealth fighter.

Project Wanderer

When you've finished covering your Wanderer and have the radio installed, seek the advice and help of an experienced flier before you test-fly your model. After putting this much effort into building a good glider, don't risk crashing it on the first flight. Follow the general flight instructions that come with the kit, because although we've modified the model, it retains the overall flight characteristics of the original.

I hope that you've enjoyed Project Wanderer, but, even more, I hope that you've learned something that will help you build better models in the future. If you have a suggestion for a future Project, let me know what you'd like to see.

IMS Show

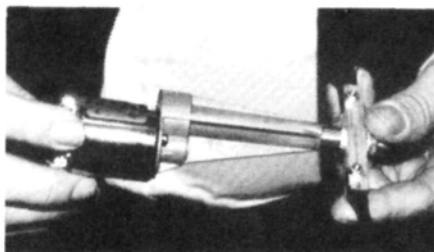
The 1989 IMS Show took place on January 14 and 15. This is the first show of 1989 and the first opportunity we have to see what's new for the year. I can't catch every new product, but I'll try to give you a brief description of those that looked interesting but haven't already been seen or advertised. If you're a manufacturer with a new product, please send me information and I'll be happy to pass it on to readers.

● Joe Utasi of Jomar Products* has done it again. In the past, Joe has offered some of the smallest speed controls for electric flight, and now, with surface-mount technology, he has made even smaller units. You really have to see these units to ap-

preciate how small they are, as the pictures don't do them justice.

At 1.1 x 1.85 x .375 inches and only 21 grams with leads (that's less than 1 ounce!) the SM-5 MOSFET speed control is the smallest I've ever seen. It's capable of running all small motors up to standard 05s on one to seven cells.

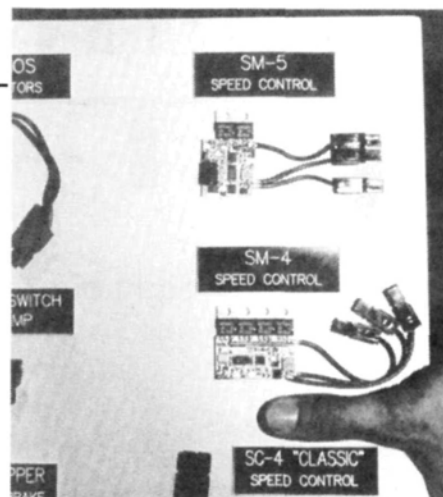
The SC-4 Classic speed control will continue to be part of Jomar's line, but it's also joined by the new SM-4 MOSFET speed control. This updated surface-mount-technology version can handle a continuous 40 amps on anything from an



Leisure's new long-shaft gear drive looks really good. Will be available in three gear ratios with Leisure's new ball-bearing motor.

05/7 cell to a 60/28 cell setup. It measures only 1.5x1.62x.375 inches and weighs 27 grams with leads. If you're pressed for space and want a top-quality speed control, look at these products.

● Roland Boucher of Leisure Electronics* showed a new exciting, motor/gear drive unit that's unlike anything we've seen before. Most units have a relatively



Jomar's new surface-mount technology speed controls are extremely compact. Small size should facilitate installation in small models.

large difference between the output shaft and the motor shaft. This offset requires a larger front end than most of us would prefer to see on our 7-cell gliders. Leisure's new, long-shaft gear-drive unit has a very small offset, and the long shaft allows for a very small frontal area. The drives are available in 3:1, 2.5:1 and 3.8:1 gear ratios.

Combined with Leisure's new Ball Bearing motors (24 and 19 turns), the long-shaft gear-drive gives glider guiders the chance to build really streamlined models. With a smaller front end, your prop will fold better and gliding performance will improve.

● The people at Jarel Aircraft Design and Engineering* (JADE), who brought us the Telos canard, have done even better by applying their interest in futuristic designs to a flying-wing sloper and an electric sport canard.

The Shogun ATF flying wing is a small, sport, aerobatic wing made of wood and vacuum-formed plastic for quick construction. The Equis canard will have sheeted-foam wings and a fiberglass fuselage, and it will use a Cobalt 05 or 15 and the appropriate number of cells. Both models are prototypes, and I'll give you more information on these great-looking designs as it becomes available.

● Bob Banka's new Scale Model Research* catalog and new listings should really excite scale glider enthusiasts. With the Scale Fun Fly in Washington coming up in May, Bob's catalog could be just what you need to ensure that your new

(Continued on page 118)



The Electro Streak from Great Planes should change power fliers' opinions of electric flight. Model is supposed to be fully aerobatic on 7-cell operation.

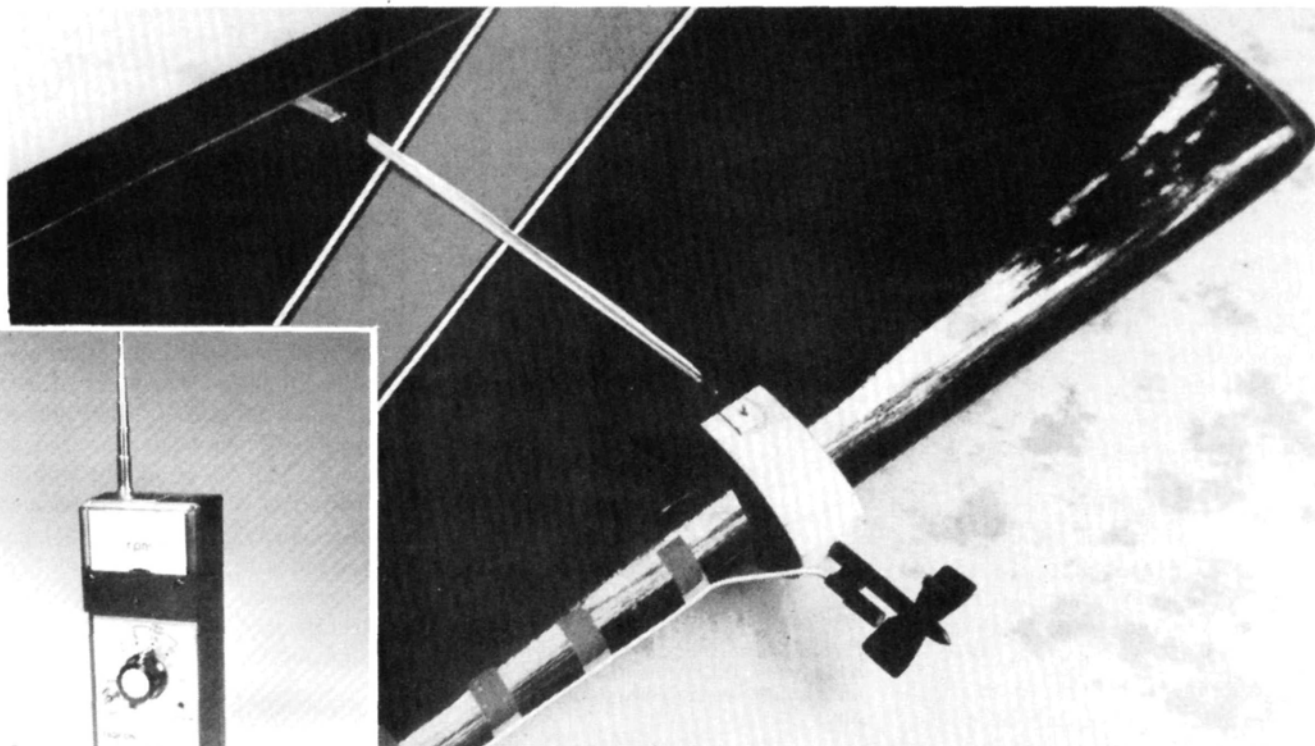


Jarel Aircraft has several new designs: The Shogun ATF flying wing is rather small, but very attractive. The Equis electric looks unique and is designed for Cobalt 05 to 15.

Mini-Val: Condor Hobbies

TELE-TACHOMETER TT-01

This lightweight airborne system takes the "BULL" out of "BALLISTIC"!



Above: An old standby, the Ugly Stik, was drafted into service as the test vehicle. The high-speed sensor was mounted on the wing in clean air. Nice feature is that mount can be temporary, allowing transfer to other airplanes for comparison.

Left: The complete system right out of the box. Contains airborne and ground-based units, plus sensors and switches.

PHOTOS BY MIKE KULCZYK AND RICH URAVITCH

by MIKE KULCZYK

NOW YOU CAN:

- measure the exact rpm of the prop, flywheel or rotor blade under actual operating conditions!
- measure the true air speed of models while in flight!
- preset the audible stall-warning alarm to save your aircraft (or a spectator)!
- adjust rpm alarm threshold for shift points or flameout warning!
- use the RDF feature to track down lost models!

Distributed by Condor Hobbies*, the Tele Tachometer system from Digicon is a complete telemetering system for true air speed and engine rpm. Additional fea-

tures are the ability to program an audible stall warning into the receiver and the use of the receiver as a direction finder to locate a lost model.

The system consists of a hand-held receiver/monitor, an airborne transmitter module, a high-speed sensor, a low-speed sensor, an rpm sensor and an accessory pack, which includes hardware and switches. The airborne portion of the system weighs less than 2 ounces and can be powered by the host R/C system or a separate 4.8 to 6V battery. Current drain is about the same as an extra servo: 25 to 40mA. Cadmium disulphide (CdS) optical sensors react chemically to rapid

changes between light and dark to modify an electrical pulse that's then fed into the airborne transmitter and relayed to the ground-based receiver/monitor, which decodes the signal and displays it on the meter in usable form.

To test the system, I mounted the high-speed sensor to a strap-on adapter on the leading edge of an old Ugly Stik, which I use for all manner of tests. The rpm sensor was mounted on the forward fuselage so that it "looked" through the prop. The push-push switch (supplied with the system) was installed and servo-operated so that we could switch from air speed to rpm and back—in flight! The system operated

as advertised. The normal operating speed of the model was around 75mph, landing speed was between 20 and 25mph and the ailerons would flutter at 85mph. In flight, engine rpm averaged 11500 to 12000.

Specifications

● Airborne Transmitter

Frequencies:

1-6 Band:	26.995 - 27.245 MHz
A-B Band:	40.665 - 40.695 MHz
T-T Band:	40.235 - 41.135 MHz



Right: This is the ground-based portion of the system. It will provide rpm and air-speed indications as well as stall- and engine-speed warnings.

For best results, telemetering and primary R/C systems should be on widely separated frequencies. A-B and T-T bands are recommended for primary R/C systems on 72/75, 53 or 27MHz; 1 to 6 band for primaries on 35 or 40MHz.

If not on identical or adjacent frequencies, both systems will operate within the same band if the RX/monitor is separated from the primary TX by at least 100 feet (30m) to minimize interference during operation.

RF Output:	0.03W (30mW)
DC Power:	4.8 to 6V. (four or five Ni-Cds)
Current Drain:	23 to 40mA, depending on rpm or air speed (about the usual drain of an extra servo).
Antenna:	43.5 inches (110.5cm)
Range:	1/3 mile (500m)
Size:	1.61x.87x.79 inches (41x22x20mm)
Airborne Weight:	
TX	.811 ounces (23g)
Air-speed sensor	.388 ounce (11g)
Switch harness	.317 ounces (9g)
rpm sensor	.141 ounces (4g)
TOTAL:	1.657 ounces (47g)

● RX/Monitor

DC Power:	9V transistor battery, type 006P (included).
Current Drain:	9 to 17mA
Signal Strength:	0 to 80dB
Size:	5.75x2.64x1.57 inches (146x67x40mm)
Weight:	13.2 ounces (375g)
Antenna:	40 inches (101.5cm) telescoping.

Meter Scale:

rpm scale:	3,000	15,000	30,000rpm
ASI scale:	High	150	300km/h
	Low	30	60km/h
			(km/h x 0.6214 = mph)

Stall-speed

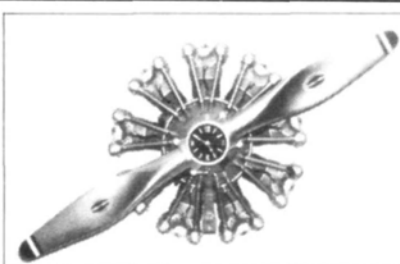
scale:	High	25	125km/h
	Low	10	125km/h

rpm warning

scale:	900	4,400rpm
--------	-----	----------

System accuracy: Air speed = +/-0.5 feet/second; rpm = +/-100

Condor Hobbies provides a very comprehensive brochure that describes, in detail, system specifications, correct installation and operating instructions. The complete system might seem a bit "pricey" at a suggested retail of \$311.50, but it might make a great club investment. It will, for sure, once and for all determine who has braggin' rights!



Imitari has just introduced an exact 1/2-scale replica of the Pratt & Whitney Wasp Jr. engine with a clock placed in the space normally covered by the propeller cone. The Imitari clock, under authorization from United Technologies, also carries the official registered trademark decal of Pratt & Whitney.

Complete kit: \$195, plus shipping
Assembled kit: \$295, plus shipping
(available in aluminum or black cylinder)

Available in kit form (more than 200 parts) or fully assembled. Imitari also carries baseball caps, T-shirts, belt buckles, decals in several different sizes, lapel pins, coffee mugs, cigarette lighters, pocket knives and even a .999 full troy ounce silver medallion, all bearing the Pratt & Whitney emblem.

Free Brochure Available

For more information on these and other products, contact

Imitari:

P.O. Box 985
Athol, ID 83801
(208) 683-3187

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Pattern Matters

by MIKE LEE



The ultimate way to get the exact look and shape of your favorite aircraft—buy the ARF version of it, like this Supra-Fly. While this is the fastest way to get airborne, you won't learn many building skills.

THERE'S A WIDE variety of aircraft types roaming the skies in pattern today, and almost all are built of two categories of materials: fiberglass and foam and built-up balsa and ply. While seasoned pattern pilots might not learn much from this lesson, newer pattern pilots might find a discussion of the differences between the materials helpful. It's a question often asked at the field.

No doubt, the fiberglass-and-foam aircraft is faster to build. While having a fiberglass fuselage usually reduces construction time by about 12 hours, it also makes for a pretty accurate fuselage with the lines that the kit pictures show you. After all, it might have been that neat picture on the box that attracted you in the first place. The foam wings present a problem to those inexperienced at this type of construction, as novices don't realize just how tricky the skinning of the wing can be, nor do they know how to avoid wing warping. Once learned, sheeting the foam wings can be accomplished in a couple of hours. Done right, it provides a strong, very accurately constructed wing that flies well.

On the other hand, the balsa airframes take longer to build, but careful building can produce an airframe that's lighter than

the fiberglass-and-foam versions, and it can be covered or painted as desired. (You *must* paint fiberglass.) A balsa airframe is cheaper and easily modified. It might also last longer, and it certainly absorbs noise more efficiently. Wood is a great sound-absorbing material. The down side of this type of kit is that if you're short of time, you've picked the wrong type of kit. The chances of warping are higher, and if you aren't bold with the sanding block in

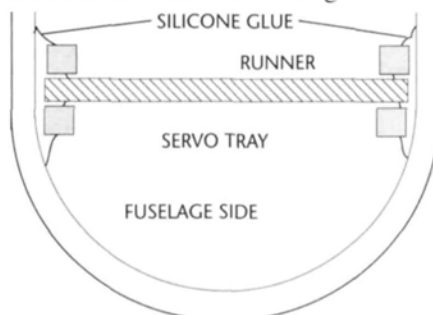


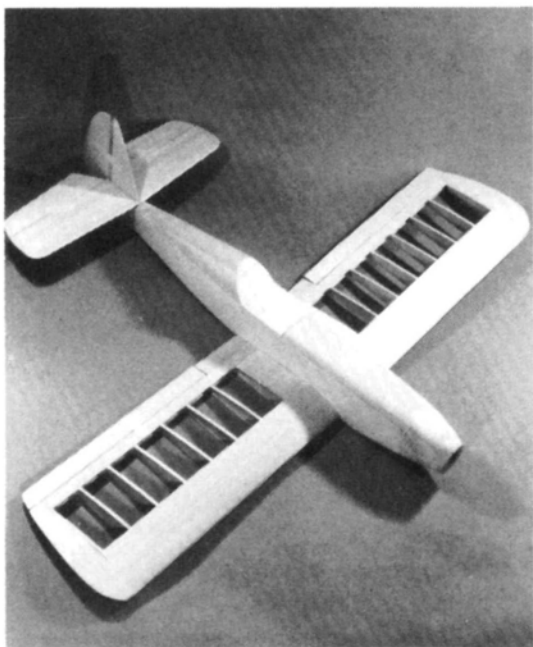
Diagram of silicone servo-tray mounting method described in column. Servo tray is sandwiched between hardwood runners and held to the fuselage with silicone adhesive. Very strong and dependable.

removing *all* excess wood, your airframe might actually be heavier than a fiberglass one. Painting will take longer, because you have to fill irregularities in the wood grain.

So, what's a poor pilot to do? Do you choose a fiberglass-and-foam or a balsa-and-ply kit?

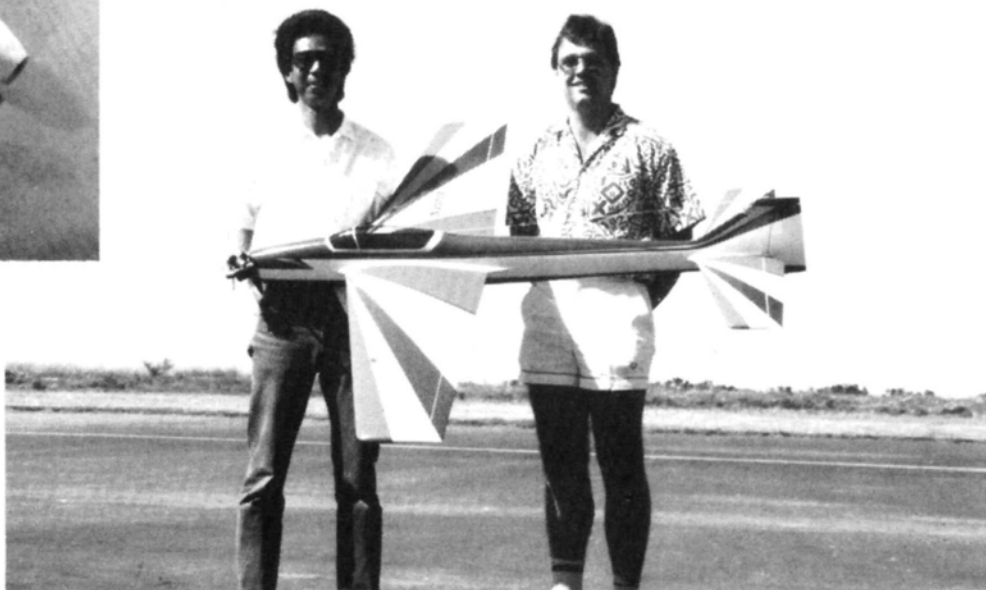
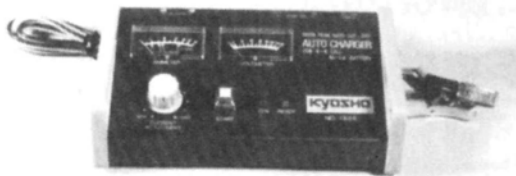
I prefer the fiberglass-and-foam kits, because they're easily and quickly built. Of course, I took my knocks when learning the ropes of fiberglass resins, contact cements and epoxies for wing skinning. There were shattered center sections that didn't have enough reinforcement, retracts that folded to the rear on landing, and other such nonsense that's encountered with fiberglass and foam. But at least I can build a plane in about 10 days and get it flying in another three. I also like the acres of room inside the fuselage for the radio gear and tank. (You don't get quite as much room in balsa kits.)

Unfortunately, fiberglass ships wear out faster, and fiberglass fuselages don't absorb vibration very well; in fact, they rather amplify it, much like a sound speaker. All that vibration takes its toll on the fiberglass and eventually wears it out. You can detect this wear when the nose starts to flop around when you flip the prop, and although you can reinforce the floppy areas, it's a pain. Further, the superb sound that a honking Rossi .61 makes when it's on the pipe and bearing down isn't all Rossi...it's *half* fiberglass



Above: The framed-up wooden aircraft that's sanded to shape. Takes many hours of loving care to get just this far. While a wooden aircraft teaches much in building skills, fiberglass-and-foam aircraft will get you this far in a fraction of the time.

Top Right: The Kyosho Delta Peak Auto Charger is a very safe field charger capable of charging transmitter and receiver packs from a 12V source. Can be used directly from the box, even though intended for use with model car batteries.



Above: Rick Verano and Henry Piourin display the fiberglass-and-foam Eclipse. The shape is what might sell this kit (meaning that anyone building it from fiberglass and foam will be able to reproduce it faithfully).

fuselage resonating like the dickens. In the game of defeating sound, a fiberglass bird is twice as hard to hush than a balsa bird.

For a novice pattern or sport pilot, I always recommend a wooden bird, as this teaches building skills that might not be learned when using fiberglass and foam. As well as this, most sport ships are available in wood, rather than fiberglass. Sure, you'll get into flying and maneuvering faster with a fiberglass ship, but don't get into a rut where you can *only* build fiberglass aircraft. The basic construction skills learned when building wooden kits are invaluable. As you progress to building your own designs, experiences with wood construction will be of great benefit in helping you make your own design fly. What do you think?

Pull-Pull System

On the product side this month, Sullivan Products* has a new addition to the

pushrod systems for which it's famous. This is a pull-pull cable system designed with competition pilots in mind. We've needed a cable system for some time, and I tip my hat to Sullivan for being one of the first to provide it.

Equipment Saver

My technical note this month deals with the method of mounting the radio tray in the fuselage. Since I've already admitted to preferring fiberglass-and-foam aircraft, I'll tell you the best method I've found for mounting my radio equipment into a fiberglass fuselage.

The key ingredient is silicone rubber adhesive (the same old stuff you find in any hardware section of most stores). I once used hardwood runners epoxied to the sides and would then epoxy the tray into place and mount up. But the vibration and the flexing of the fiberglass tended to break the epoxied joint every

100 hours or so, and an overhaul was needed. With the silicone method, this overhaul chore disappeared.

I start with a tray of plywood, custom-fitted to the inside of the fuselage and then punched to fit the servos in the arrangement I like. (I just don't trust the plastic trays.) Once fitted, I cut hardwood runners that will fit along the edges of the tray, one on top of the tray and one underneath, for both sides of it. These don't have to be very wide—maybe 1/4 inch square.

After mounting a couple of servos into the tray for fitting the tray depth to the fuselage, I run a light bead of silicone along the fuselage sides where the lower runners will lie. So that I don't have to wait all night for the silicone to set, I use a couple of drops of Hot Stuff* to hold the runner in place. I then run a heavy bead of silicone along the tops of the run-

(Continued on page 126)

Wire your own Ni-Cad battery pack

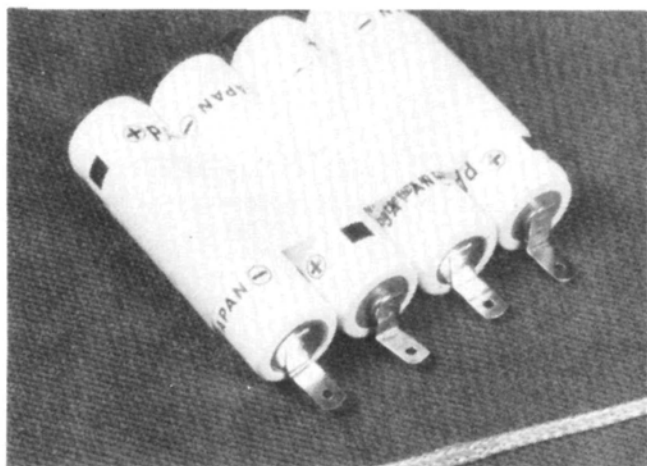
TECH TIPS

The ready availability of new-generation Ni-Cd cells in various sizes and power capacities now enables us to tailor our battery packs to specific requirements. The technique illustrated here shows you how to do it. Although the cells shown are the typical AA size, the method may be applied to any tabbed cells.

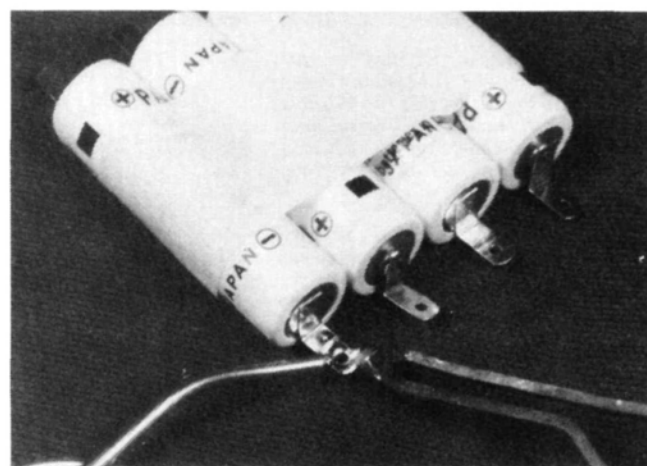
by RANDY RANDOLPH



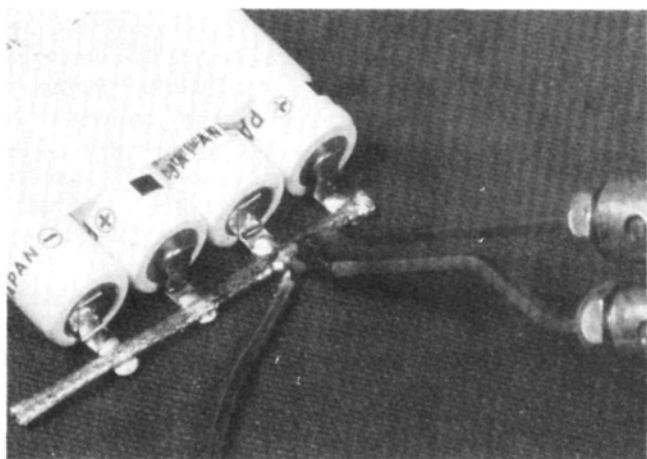
1. Buy only batteries with solder terminals. Heat is the enemy of Ni-Cds, and the terminals make it possible to solder to the cells without damage. Bend the terminals as shown.



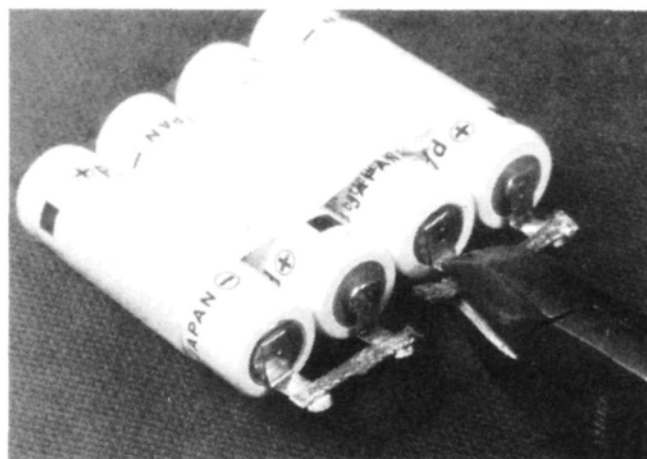
2. Tape four cells together with masking tape so all the terminals line up. The plus and minus terminals should be alternated so each plus has a minus next to it. The idea is to solder the cells together just as they would go in a flashlight: in series.



3. Tin all the solder lugs. Touch the hot iron to the end of each terminal, then simultaneously bring the solder to the terminal and the iron. As soon as the solder flows smoothly on the end of the terminal, remove the heat.



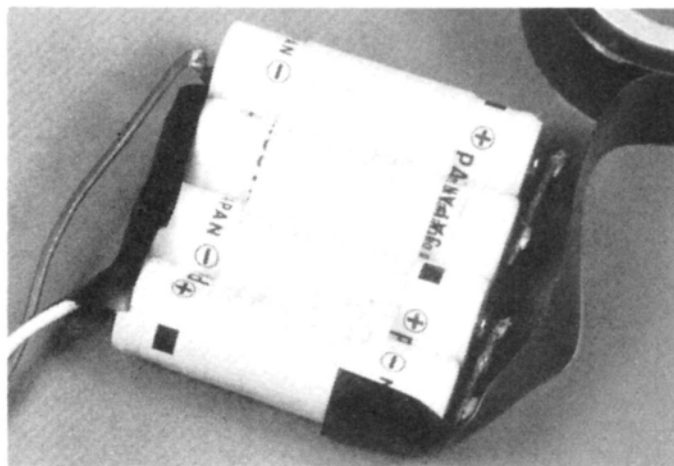
4. Solder a strip of $\frac{1}{8}$ -inch braid across all the terminals on one end of the cells; the other end of the cells will be connected later. You can also substitute tinned wire, or even a strip cut from a tin can.



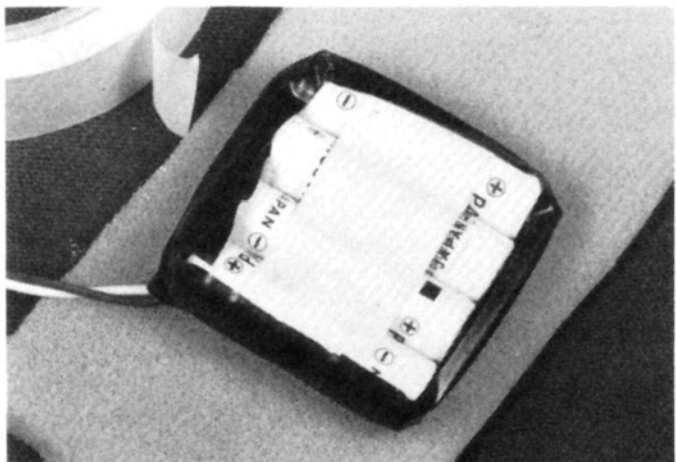
5. Cut away the braid between the two middle cells. This leaves two sets of cells connected, with a plus to a minus. It's easier to solder a strip across all the terminals at one time and to cut away part than to try to keep the smaller pieces aligned while soldering.



6. Solder a small strip of braid across the two center cells at the other end and the connections for a 4.8V battery are complete. Bend the terminals flat against the top of the cells.



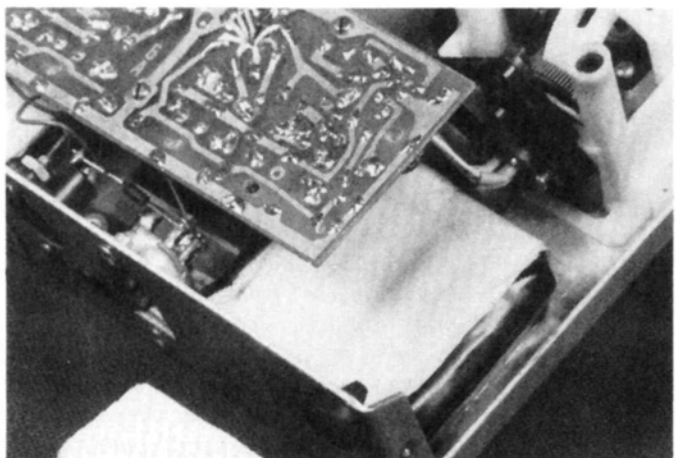
7. Solder the battery leads to the two unused terminals on each end, and place a piece of electrical tape on the terminals between them. Wrap electrical tape around the ends of all cells and twist the leads into a cable.



8. Cut a strip of 6x12-inch $\frac{1}{4}$ -inch-thick foam rubber, and wrap it around the sides and ends of the battery. Hold it in place with masking tape wrapped around, end to end.



9. The completed pack. The padding is adequate for installation in a transmitter but, like all flight packs, it should be wrapped in more padding when placed in the aircraft.



10. The battery pack nestled in a transmitter case. It's held in place with double-stick tape and a block of foam. For proper operation, transmitters usually require two packs, for a total of 9.6V.

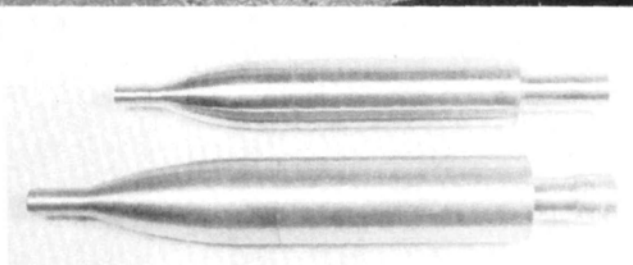
DUCTED FANS for the Beginner

by RICH URAVITCH

MODEL JETS powered by ducted-fan systems aren't new: They've been around for decades. However, only within the last five years or so have they really created their own little niche in the R/C modeling world. It's difficult to pinpoint the reason for the rapid growth in their popularity because there are many contributing factors, not the least of which is the widespread availability of reliable components, including kits, fan units and engines of incredible horsepower for their size. All fan units function as "air movers": They pull air in, accelerate it and blow it out at a high velocity. The more horsepower available, the faster the rotor can be turned and the more static thrust produced. This is the basic idea. Of course, that doesn't mean you can attach a 5hp .80-size engine to a rotor designed for a .20-size engine and realize huge performance gains. Even if the rotor could hold together, which is unlikely, the engine would probably self-destruct, and if that didn't happen, you still wouldn't get a usable increase in thrust, owing to a number of other reasons.

If anything has inhibited the growth of fan activity, it's probably the apprehensions of some modelers about getting involved. Much of their anxiety is the result either of lack of information, mis-

Some helpful information about model jets



These tuned pipes are fabricated by MACS for the .20- and .45-size fan engines. The .45 size (above) is pre-tuned to length and slides right over the exhaust header supplied with the engine.

Any ducted-fan meet will usually bring out a lot of airplanes that are excellent "first" DF models for beginners. Two of the better ones are shown here: the Byron F-16 and the Parkinson Regal Eagle.

information, or, as is now a government buzz word: *disinformation*. To help some of you newcomers, here are some of the most frequently asked questions (and, of course, answers) about ducted fans.

● **Are ducted fans actually jet engines?**

No; they're propulsion systems that use a high-performance version of the 2-stroke, glow-plug-ignition engines with which most R/C fliers are already familiar. These engines drive multi-blade, small-diameter rotors running inside a duct. No exhaust heat, just air.

● **How fast do some of these models go?**

This is about as variable as it is with conventional prop-driven models. The fastest sport jets can exceed 180mph, but the more average model operates in the 100-120mph range, which is about the same as some of the higher-performance pattern ships. The important thing to remember is that, in most cases, the jet retains a lot of the low-speed characteristics of the typical sport model with landing speeds in the same range.

● **How difficult are they to fly?**

For most of them, your flying ability

should have progressed to the point where you feel comfortable with a low-wing, sport-pattern-type airplane like the Kaos. Some jets, e.g., the Byron F-16 and the Parkinson Regal Eagle, are even easier to fly than a pattern-type airplane.

● **Do I need to be an engine "expert"?**

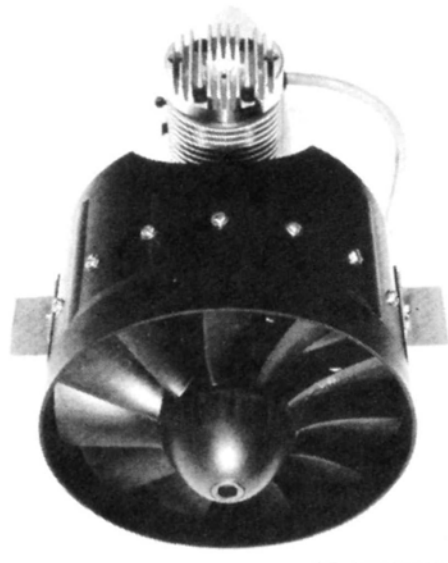
You have to be as much of an expert as you are now when operating conventional airplanes. The technique is the same; even the use of tuned pipes has been simplified with pre-packaged "systems" that "tune" the pipe to the required length.

● **What level of building skills should I have?**

Building a jet model is no different from building any other plane. The available kits are made of the same materials as prop airplanes, and the adhesives, the finishing products and the accessories are all the same, too. What is different is attitude and awareness. You have to think constantly of weight savings, and you're building the inside of the airplane as well as the outside.

● **Can ducted-fan models be operated off grass surfaces?**

Many can, but there are a number of considerations, including the possibility of ingesting grass and debris through either the inlet or a cheater hole. This can cause fan blade damage, which can lead to destruction of the fan or, even worse, the entire airplane, as a result of vibration. Fan-powered airplanes generally take longer to accelerate on takeoff roll, and grass fields increase this distance. None



A ducted-fan unit, like this Jet Model Products Dynamax, opens up new vistas in R/C scale modeling. When you start using fans, have a continuous respect for their power, and always be aware of potential dangers.

ways use a good grade with sufficient suitable lubricant to withstand the rigors of sustained high-rpm operation.

● **How much do ducted-fan airplanes cost?**

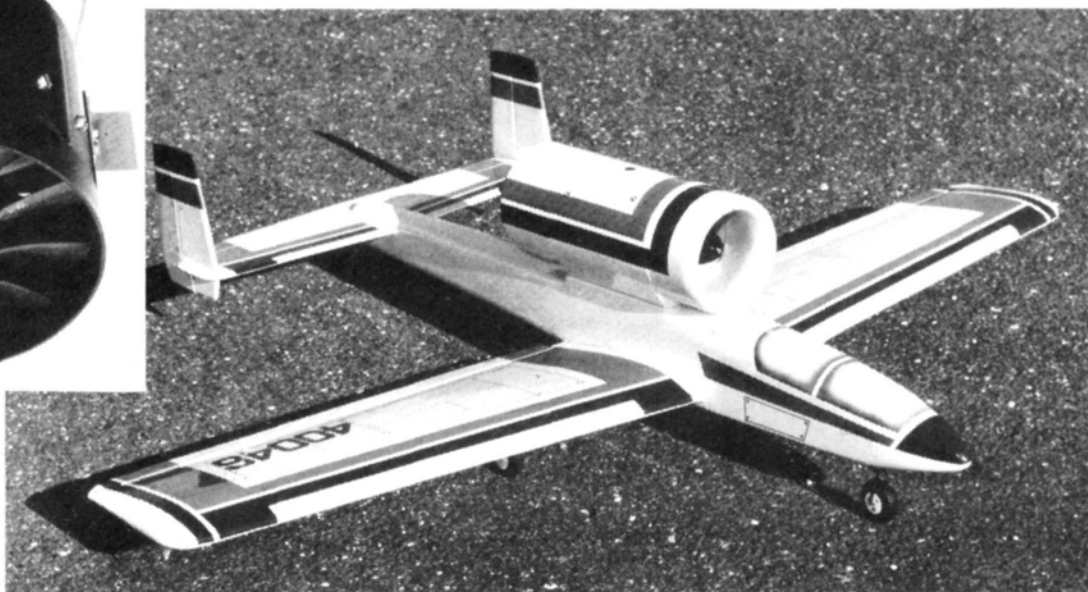
This varies with the completeness of the kit, the materials used and other factors. Kit prices range from around \$100 for a simple wood-and-foam airframe, right up through \$3,800 for a scale F-14 Tomcat complete with two power packages and wing-swing mechanism. If you buy everything, including the radio, \$500 to \$750 can get you started.

● **Do ducted fans require any more equipment than I might already have**

the Fan Flys that go on at various times throughout the country. Become a regular reader of our "Jet Blast" column. Take your lead from fellow modelers who have actually operated ducted-fan models, not necessarily your club's "expert," who might know less about them than you do, but feels that he has an image to maintain.

Ducted-Fan Terms

Blow-in Doors: A means for providing an additional air source to the fan unit. These are usually part of the fuselage skin, which is hinged, opening through increased suction provided by the fan. In



The simplest configuration for ducted-fan airplanes is represented by this Dick Sarpolus design: the Jetster. While it might teach you basic fan operation and handling, it's a little "draggy," so don't expect true jet-like performance from it.

of this is helped by the fact that fan models are usually equipped with small-diameter wheels.

● **Are high-nitro-content fuels necessary?**

Not at all. In fact, most fliers prefer to burn 5- to 10-percent nitro in their fuel, because it extends glow-plug life, makes pipe and needle-valve settings much less critical, and the fuel costs significantly less. What should, however, be a consideration is the selection of fuel itself. Al-

for my regular R/C airplanes?

Not really. Building and flying equipment are the same. The only different thing that you might need is some type of starting "wand" or "probe" that allows you to start the engine through the tail pipe or inlet duct.

● **Where can I get more information?**

Easy. Look through this issue and consult our "Ducted Fan Source Directory." We've provided names and addresses for you to use in your search. Attend some of

flight, they usually close, because ram air is fulfilling all the air requirement.

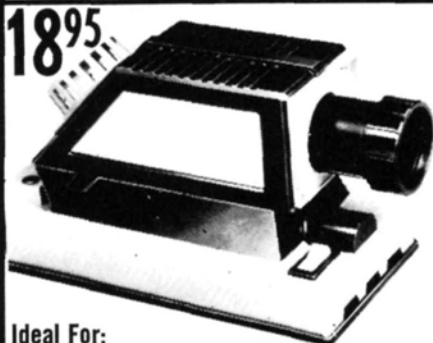
Center Body: The central component in some fan units. It provides a mount point for both the engine and the root attachment for the fixed stator blades.

Cheater Hole: A non-scale opening, usually in the bottom surface of the airplane, located so as to provide a supplemental air source to the fan unit.

Duct: A component designed to provide

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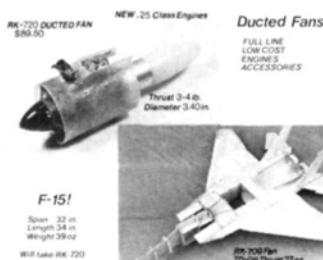
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FAN BASICS



a smooth path for air to flow to and from the fan unit. See Inlet and Tail Pipe.

In-Flight Mixture Control: An on-board, servo-operated device that provides the capability for varying the engine's needle-valve setting in flight to compensate for changes in fuel delivery caused by improper initial settings and tank-pressure variations.

Inlet: That portion of the internal air ducting that delivers air to the fan unit.

Pusher Fan: A fan-unit configuration that places the engine forward of the fan rotor, similar to a pusher prop arrangement. The Byrojet unit is an example of this configuration.

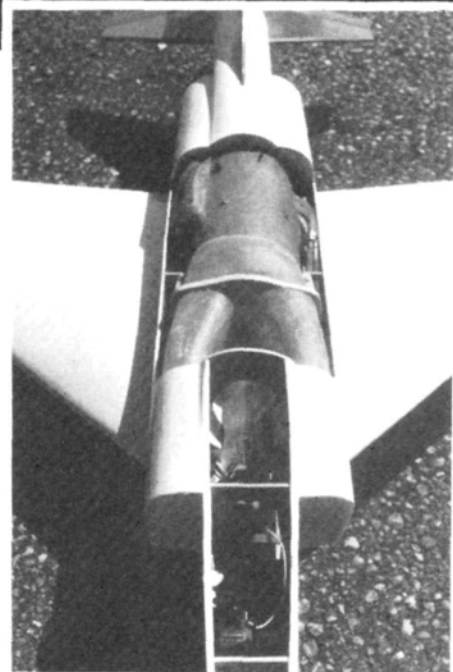
Remote Needle Valve: A fuel-mixture adjustment device that removes the needle valve from the engine and places it outside the duct for easier, safer access.

Rotor/Impeller: That portion of the fan unit that's driven by the engine. The "propeller" of the fan system.

Shroud: The portion of the fan unit that represents the container or housing for all the other components. When integrated with the inlet and tail pipe; it becomes part of the duct system.

Stator: The fixed-blade portion of the fan unit, this is usually located directly behind the rotor. The stator blades are pitched in a manner that permits them to gather the air being accelerated by the spinning rotor and straighten its flow to smooth it out as it exits the tail pipe. The smoother it is, the lower the degree of drag that's created, and this increases the velocity, which increases the "push."

Tail Pipe: That portion of the internal air ducting that carries the accelerated air from the fan unit.



Good ducting systems are important to allow maximum efficiency of fan units. This hand-fabricated inlet was made by Dave Penchuk and installed in his Zirolli-designed F-4, which uses a Kress RK-740 fan.

Thrust Tube: Generally used interchangeably with tail pipe.

Tractor Fan: A configuration of fan unit that places the engine behind the fan rotor, similar to a conventional propeller arrangement. The Viojett, Turbax and Dynamax fans are examples of this.

We hope that this information, along with all the other ducted-fan material presented in this issue, gives you a better understanding of this exciting segment of R/C modeling, removes the "shroud of mystery" and maybe provides that little push you might have needed to start flying your own jet!!

YELLOW AIRCRAFT



Airborne on a "dirtied up" fly-by, the Skyhawk remains quite stable and predictable.

A-4 SKYHAWK

by RICH URAVITCH

JUNE 22, 1954: Nearly 35 years ago, the very first A-4 Skyhawk made its first flight. Ed Heineman headed the design group, and it wasn't until 20-plus years later that he had an opportunity to fly the airplane he designed. Through the years, the A-4 (officially named the Skyhawk) has endeared itself to virtually everyone who has flown it. Over the years, lots of pet names have been applied to this diminutive attack jet—everything from "Heineman's Hot-Rod" to "Scooter" and "Tinker-toy" through the current label of "Mongoose," which was adopted by

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the Navy Adversaries of VF-126 and the Top Gun guys from NAS Miramar. Although the end of the A-4's

tour of duty might be on the horizon, since it's being replaced by the F-16N, it's still likely to be around for some time, if not with *our* Navy, then certainly with some friendly foreign country. The last A-4—an "M" model—was delivered in February 1979 and concluded a production run of 2960 Skyhawks. If the Medal of Honor could be awarded to machines as well as to men, the A-4 would definitely be cited for "upholding the highest traditions of the United States Naval Service."

From a modeler's standpoint (especially that of the ducted-fan enthu-

SPECIFICATIONS

Type: Sport-scale jet

Span: 40 inches (45-inch wing is optional)

Weight: 9.75 pounds

Wing Area: 565 square inches

Wing Loading: 39.7 ounces per square foot

Power Required: .65-.77 with Dynamax or equivalent fan unit

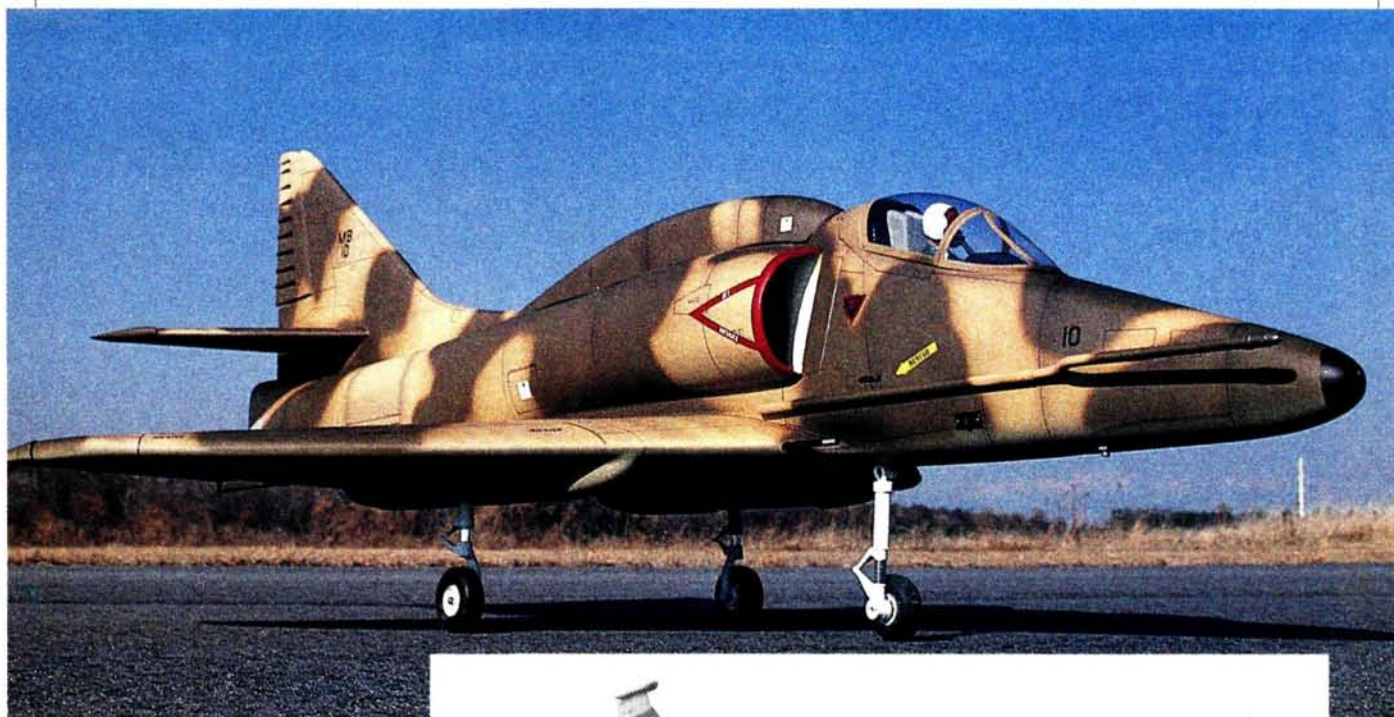
Number of Channels Required: 5 with retracts (no provision for fixed gear)

Suggested Retail Price: \$520 (Package includes Dynamax fan, O.S. .77 and tuned pipe.)

Features: Fiberglass fuselage, inlet/exhaust ducting and accessory parts, pre-sheathed foam wing and stabilizer cores. Hand-cut balsa and ply parts.

Two sheets of drawings and an illustrated assembly manual.

Comments: An excellent buy, especially at the package price, which includes the propulsion unit and accessories. Good-quality kit goes together fairly well and flies quite honestly, especially if fitted with the optional 45-inch wing.



PHOTOS BY RICH UKAVITCH

Above: With many friendly nations using the A-4, attractive paint schemes aren't all that difficult to find. Nose-gear strut should be at least 1 inch longer for a more scale-like ground "stance."

Right: Here's the full-scale A-4 we used as reference when finishing our model. Fin could have been modified to include radar housing.



siast), the A-4 conveys a friendly feeling right from the beginning. It has nice proportions, reasonably sized inlets that, even when slightly enlarged, don't seem obtrusive, and (particularly of

late) offers the scale modeler a wide range of colorful and attractive finishes. The big box-office hit "Top Gun" sure didn't hurt, either: It accurately cast the A-4 in its role—something that *couldn't* be said for either Tom Cruise or Kelly McGillis!

Given the A-4's "cuddle-up-and-hug-me" ambience, it should come as no surprise that a number of kit manufacturers have chosen to model it. Bob Violett did one years ago—one that gave the modeling public its first look at a good-performing scale jet that doesn't have a prop on its nose. This design was sold to Jet Hangar Hobbies and is still available. Midwest Prod-

ucts had its Zirola-designed molded-foam fuselage version, which took the RK-049 1/2A fan. Byron Originals produced a version as an addition to its expanding jet line, and it's the largest A-4 currently available. There's yet another available in kit form from Bauer in Germany. That's a lot of popularity for one airplane type in an admittedly small segment of the R/C market.

So let's take a look at the newest, and certainly the most prefabricated, version of the Skyhawk: the one from the Yellow Aircraft Company*.

When the ads for the A-4 first appeared, they gave some the impression (and understandably so) that *this* A-4 was an ARF kit. (That's "Almost-Ready-to-Fly," not some colloquial expression for dog!) Before we get into the kit, let's set the record



Rather steep approach for a landing, right? This heartbreaker destroyed about two months' work. Suspect battery failure.

(Continued on page 68)

VIOLETT VIPER

(Continued from page 19)

holes, which this product eliminates very effectively.

All balsa surfaces were block-sanded with 220-grit sandpaper, covered with ³/₄-ounce glass-cloth and Loctite Epoxy Finishing Resin. Loctite has recently developed this resin, which is strong, light, and doesn't have the obnoxious odor of most of the polyester resins. Application is simple: I always like to start with the undersurface. Lay the cloth over the surface to be covered, and pour a bead of the Finishing Resin down the center. Use a 2-inch plastic "squeegee" or playing card to spread the resin from the center outward to the edges. (It's surprising how far a small amount of this product will go.) Just leave enough resin on the surface to fill the weave of the cloth. Any surplus can be removed by the squeegee and put back into the mixing cup. The surface should eventually have a matte, slightly wet-looking finish. When all surfaces have been covered in this way, block-sand them with 150-grit sandpaper and repeat the resin application. The surfaces should have a more shiny look after this final coat. Block-sand with 220 grit, then 320 grit to prepare the surfaces for primer application.

I've had my best luck with model finishing using the K&B line of primer and paints. K&B primer will stick to any surface, it's fuelproof, and any paint will stick to it. However, please note, whether it's a K&B paint product or an automotive paint product; many ounces of unnecessary weight can be added to a model by careless painting. All film thicknesses of any primer or paint should be kept to a minimum!

After applying the first primer coat and before sanding, mix a slurry of K&B primer and microballoons and dab the remaining imperfections with a brush. Block-sand with No. 220 grit (dry) until the only remaining primer is in the low spots. Spray on a second *thin* coat of primer and sand with No. 320 paper (dry). Spray a *thin* coat of white paint on the entire model and wet-sand with 400-grit paper. This step keeps the model lighter because only a minimum of pigmented color is needed for adequate coverage.

Since I'm a Thunderbirds fan, and the Viper has sleek lines, the T-Birds' paint scheme seemed perfect! 3M fine-line tape (available at automotive paint-supply stores) was used for the most of the masking work. Bob Dively* Liquid Spray Mask was used for the difficult areas, e.g., vertical fin scallops, bird feathers, letters,

etc. After base and trim colors had been applied, the entire model was wet-sanded with No. 600 paper to remove any dust and to blend the mask lines. Inked panel lines and decals were applied before spraying on the clear coat. Ditzler Del-Glo automotive clear was used because of its superior gloss and durability. Dust can be removed by block-sanding with No. 1200 paper and buffing with a light polishing compound. K&B black with the flat hardener was used with an airbrush to add a realistic look to the nozzle area.

PERFORMANCE: Like all BVM jets, the Viper incorporates a unique starting system. A starter probe is inserted through a carbon-fiber flexible door on the side of the model. This probe engages the rotor-retaining bolt by means of a hex-ball driver that's soldered to the opposite end to engage any standard electric starter. When the engine starts, the probe is removed. Very effective, simple and safe! When the mixture is set correctly, the KVB 72 starts effortlessly.

Combining the KVB's brute power and the clean aerodynamic lines of the Viper, creates one awesome package. Takeoffs on our grass field consistently average 100 feet or less with flaperons in the down position. I recommend this for all takeoffs, including those on asphalt. Controllability of the Viper in this mode is more than adequate, and the model is extremely stable, even at the slowest speeds.

Phenomenal is the only word to describe the Viper's high-speed performance! At 170mph, the Viper is rock solid and very manageable. A word of caution: a model traveling at these speeds exits the flying area very quickly. *Always* be prepared to throttle back or set up for your next pass *before* the model gets too far away. In 3 or 4 seconds, a high-performance jet can travel too far for a good visual reference.

I've flown many models, including various pattern planes and other high-speed machines, but none matches the performance of the Viper! It will fly the AMA pattern with the grace of the best pattern plane and then streak by with the speed of a Formula 1 racer. There's a special thrill that comes with making a 10-foot-high pass and then literally rolling vertically out of sight. To experience this thrill for yourself and become a true "jet jock," try the Viper. I guarantee that you won't be disappointed.

(Continued on page 82)

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SKYHAWK

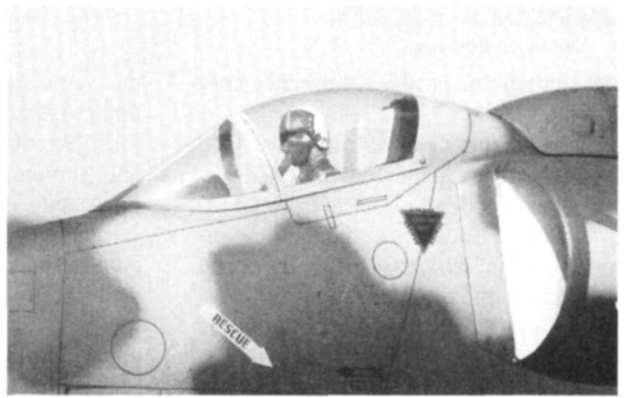
straight: It *isn't* an ARF. It *does* have a higher level of prefabrication than some jet kits and all jet semi-kits, but don't expect to open the boxes on Friday and have it ready to fly by Sunday. To accurately estimate the time it will take, figure the building time for a typical fiberglass fuselage/foam wing and tail kit, and subtract the time it would take you to sheet the foam cores. That's the only real difference. In fact, since it's a jet, you might add back that time and more when you get into the inlet duct and fan installation. Having said that, let's see what's in store.

THE KIT: This is shipped in two boxes: One houses the fuselage and most of the fiberglass parts, like inlet and exhaust ducts, hatch cover, vertical fin and main landing-gear pods. All the balsa parts are neatly bagged, and the bags are numbered to correspond with the building instructions. The other box contains the wing and horizontal stabilizer foam cores, which

are pre-sheathed with balsa and nestled in their foam cradles for protection during shipping. I've heard that some of the first kits to be shipped incurred slight damage

in transit, but the problem has been remedied with revised packaging.

The kit's components are of good quality, the fiberglass parts being pin-hole-free and without warps. The lay-up process produces a component of consistent thickness, and there's no evi-

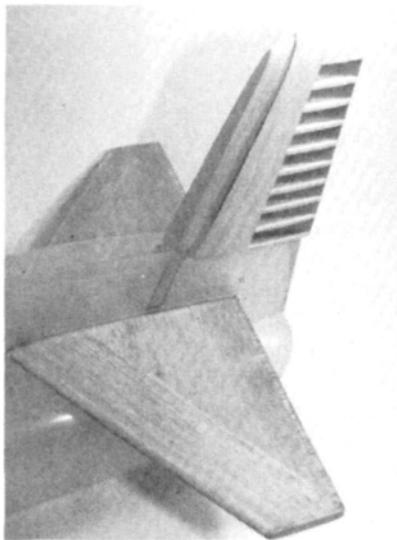


Close-up reveals installation of DGA military pilot, which provides realistic touch.

the fuselage *should* consist of symmetrical halves, why should the bulkheads be *asymmetrical*? Beats me! They will fit as supplied, since you'll be glassing them into position anyway, and the glass-cloth will fill the gaps; but shouldn't the gaps at least be the same? However, to ensure proper wing alignment, I suggest that you at least make symmetrical the part of the bulkhead that forms the stub spar to which the wing attaches.

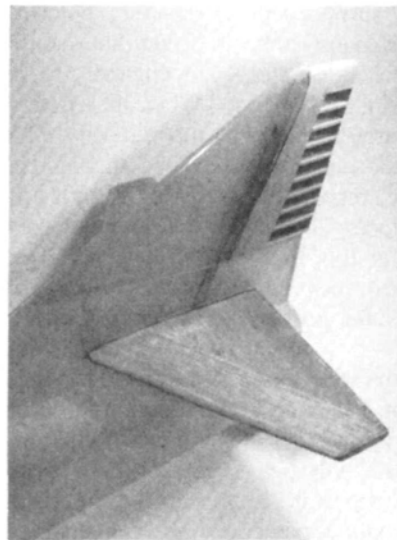
The instructions that came with the kit—*didn't!* They arrived much later, in preliminary form, followed even later by the final printed version. I built

my Skyhawk from the preliminary set, which was adequate for the job. The big advantage of the final version was the inclusion of two large blue-line drawings



VERTICAL FIN INSTALLATION

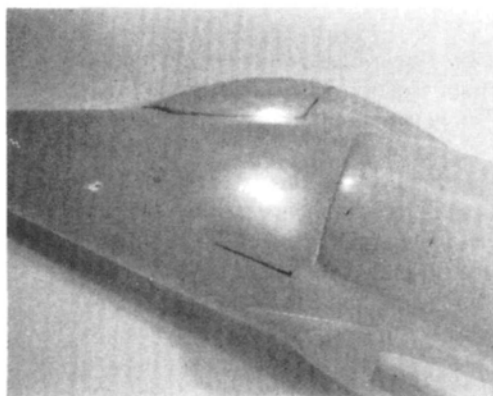
Balsa fin post must be pre-shaped prior to installation. It also ties fiberglass sides to horizontal stabilizer. After shaping, fiberglass fin is added.



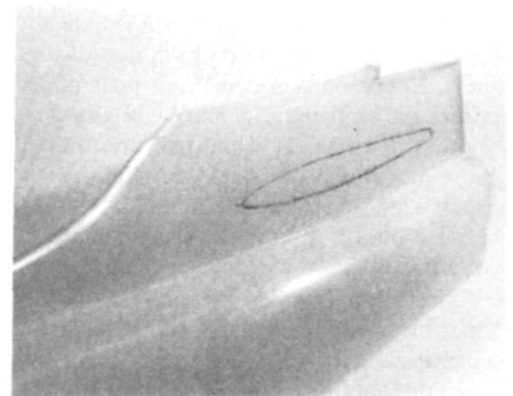
dence of resin puddling, which would add unnecessary weight with no gain in strength. Not nearly as consistent were the light-ply fuselage bulkhead halves. Since



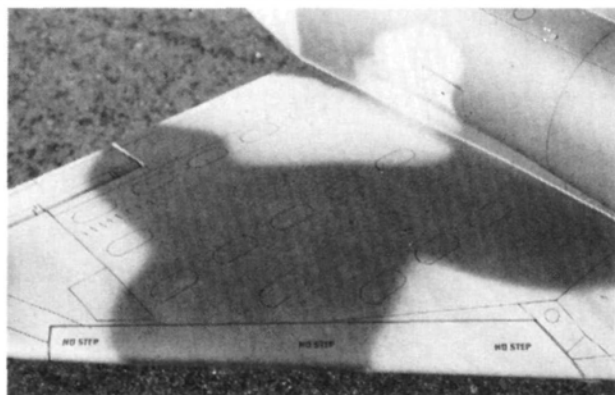
Nose gear is Spring Air unit "dressed up" with Robert covers. 20mm cannon at wing root made up from dowel.



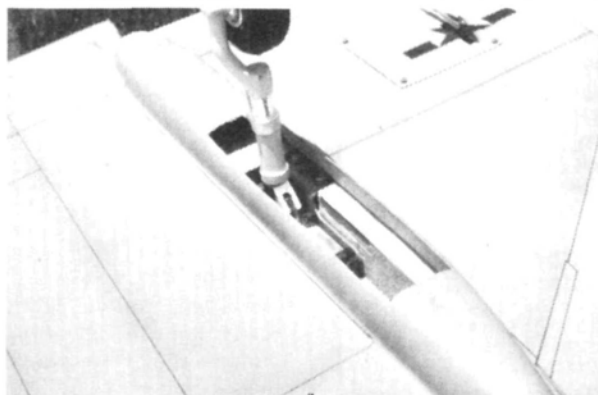
"Canopy" portion of fuselage is removed and replaced with transparent item. Removeable for equipment access. Line on lower fuselage indicates nose-gear mount location.



Vertical-fin portion of fiberglass fuselage must be cut out to accept horizontal stabilizer. Dremel works great!



Surface detail consists of inked panel lines, stenciling and weathering in the form of chord-wise "streaks."



Spring Air retracts with Robart covers used on main gear also. Units retract forward. Gear pod is fiberglass. Chrome MonoKote trim used to simulate "oleo" section of strut.

that completed the assembly picture and made the building sequence more understandable. The kit's release should have been delayed until the building instructions were available; after all, what can you do without them?

CONSTRUCTION: Like many other jet models, the A-4 has its servos located in various spots throughout the airframe. This is necessitated by the space taken up by the propulsion system, which consists of the "Y" inlets, the fan unit and the tail pipe. Everything else is positioned so as not to impinge on this system. To the modeler used to mounting all the radio components in a compartment on a tray, this means a change in building philosophy. A servo tray here is about as useful as a runway *behind* you! For example: The elevator servo is mounted on the horizontal stabilizer and then tucked away neatly *inside* the vertical-fin base. If it ever fails, you're in trouble; so be sure to use your most reliable unit in this installation. Another thing that represents a departure from the way things are "normally" done is the way the Skyhawk's wing is attached—with epoxy and glass tape! That's right, folks! This A-4 is a *one-piece* air-

plane, but its short (40-inch) span allows it to fit handily into my Mustang hatch-back.

As I stated earlier, I built the Skyhawk according to the provided instructions and experienced no real difficulties. Fitting the fiberglass vertical fin to the balsa spar required some fitting and sanding, but it eventually fit well, and the tail end of the airplane came together. The internal ducting fit surprisingly well also, especially considering that the two-piece fiberglass "Y" duct must be joined rather precisely to mate with the fan unit. Before permanently installing the inlet and exhaust ducts, I sprayed them with K&B Superpoxy, inside and out, as this will go a long way toward protecting them against the long-term ravages of fuel exposure. While you're at it, paint all the exposed wooden parts as well, e.g., the bulkheads, the tuned-pipe hanger, the nose-gear mount and the fuel-tank platform.

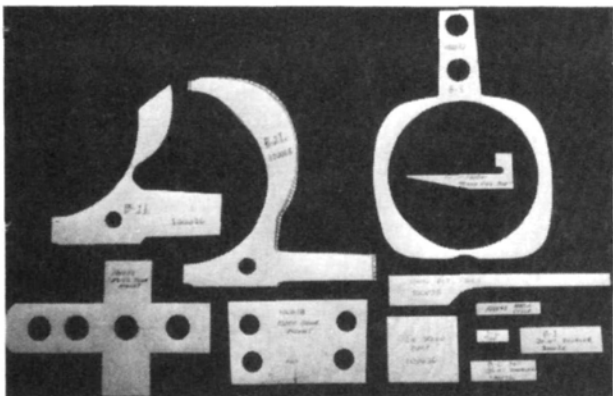
When attaching the wings, since I didn't have a clue as to what the dihedral should be, I referred to a three-view I had on the A-4. The nose view showed the upper surface of the wing to be perpendicular to an imaginary vertical fuselage

reference line. The dihedral is created by the taper of the wing. Working on a level surface, I positioned the wing panels on the stub spars and blocked them up at the tips until the upper surface of the wing was parallel to the building surface. It looked right, so after scuffing the glass surface of the fuselage, I permanently attached the wing panels with 30-minute epoxy. When it had cured, I followed the glassing procedure provided in the kit.

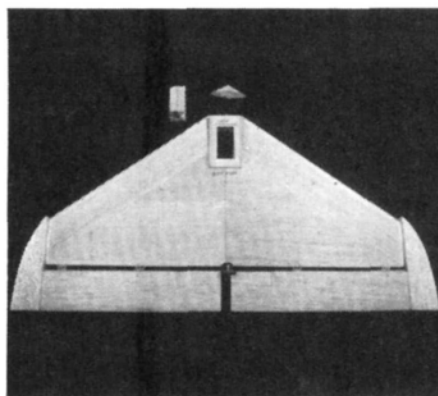
All the balsa-sheeted surfaces were final-sanded and then covered with lightweight glass-cloth bonded with Loctite* finishing resin. The entire airframe was then scuff-sanded and wiped down with alcohol in preparation for the first coat of K&B Superpoxy primer. This coat was sanded nearly completely off, and the fuselage was then inspected for any pin holes or seam lines. The small number that were found were filled and sanded, and the final coat of primer was applied, followed by a final sanding and wipe-down.

The colors chosen for the A-4 were straight out of the can: Chevron* products. As a matter of fact, the tan base color used on the upper surfaces was applied

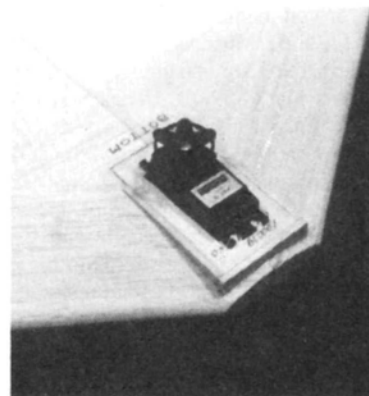
(Continued on page 130)



he ply, hand-cut parts have some inconsistencies in parts that should be symmetrical. You should make "stub spars" identical to allow proper wing mounting.



Horizontal stabilizer after assembly and installation of servo platform. Foam cores are pre-sheathed.



Elevator servo installed on platform. This view shows lower surface. Installation ensures short, positive linkage, but renders servo inaccessible without "surgery."



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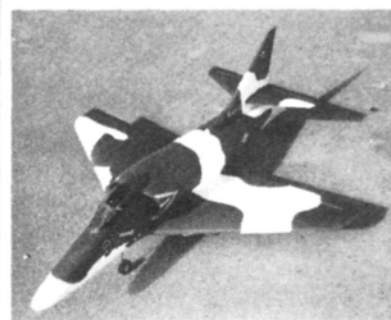
YOU GUYS ARE absolutely amazing! We received a lot of responses identifying our "Mystery Warbird" shown on page 74 of the February '88 *MAN*. Here are some of the answers we did receive up until press time for this issue: A Curtiss P-40Q, a Commonwealth CA-15 from Australia, a North American YAT-28, a Spitfire. A lot of you identified it as various versions of the P-51 Mustang. Well, thanks for playing, but 32 of you got it right! The airplane is a Fiat G.59-4B Advanced Trainer built in Italy. This Mustang-sized machine is powered by a V-12 RR Merlin and cruises comfortably at around 285mph at 18,000 feet. This particular example is owned and flown by Guido Zuccoli, who also has a number of other warbirds in his growing stable. The impeccable restoration was performed by Frank Sanders' shop in Chino, CA.

The winner? Greg Nicholson of Lincoln, NE. Greg's entry arrived on January 5, so we can only assume that he fired off his answer within *minutes* of receiving his copy of *MAN*. Congratulations, Greg, your subscription is on its way. ■

YELLOW AIRCRAFT A-4

READER'S REPORT

by CHRIS DELLINGER



THE A-4 HAS never been high on my list of nice-looking jets, but I ordered one after seeing it fly at a fan meet. Seeing the Yellow Aircraft A-4s perform really got my attention, and I wasn't alone; three others were ordered by folks in my club. A week later, the boxes arrived.

I ordered the whole package, including a Dynamax fan, Spring Air retracts and the kit. The first thing that I noticed was the outstanding sheeting on the wings and stab (I only *dream* of being able to sheet like that!), and the second was how much I was getting for my money. When it comes to fans, I've spent a whole lot more for a whole lot less!

The kit is outstanding, but the glass work could be better, as there were a few pinholes to fill. The building is easy; painting is the hardest part. Most of the wood is provided, but some items have to be cut from 1/32-inch plywood, which you have to provide. No hardware, useless plastic hinges, or other garbage is included, but I usually end up throwing most of that stuff away and using the brands and types I like, anyway. Besides, if you've made it as far as jets and you strip your wrecks, you'll have lots of little parts lying around just begging to be reused.

Two things bothered me while I was building: the location of the rudder servo and the fit of the formers. The rudder servo is in front of the nose wheel, and you're supposed to run a 4-foot Nyrod back to the rudder. I chose to put a rudder servo in the front part of the vertical stab, and I left the other servo up front for nose-wheel steering. The CG didn't turn out to be a problem.

As for the formers, the shapes of two of the five pieces weren't very close to that of the glass fuse. With some work and filling they were usable, but many people would have just replaced them.

For the most part, the instructions are great, but there were some typos, missing template illustrations and no dihedral measurements. The good news is that I found out about the corrections because Yellow Aircraft sent me an update. They caught me in time for the typos, but not for the dihedral. However, using the fuselage wing fillet as a guide, I was within 1/8 inch.

I understand that Yellow will soon start sending us newsletters containing updates on changes, new ideas from modelers and sources of info on improving the appearance and performance of our planes. For example, I have photos of the A-4s at

Miramar NAS, and they have some really interesting paint schemes. (They're the Aggressor squadron A-4s used in "Top Gun.") The idea is to provide help, not to advertise.

This was my first attempt at a camouflage paint job. I used Perfect Paint and was impressed with how well it covers, as it only took two light coats. Wanting to keep it light, I didn't leave much primer on the surface. Ready-to-fly weight is 9 3/4 pounds.

Now to the real reason we're into this stuff: the *flying*. I had to wait 10 days before the weather was good enough for a test flight. Here in Northern California, that's a long time to wait, even in January, but it was worth it!

Once I'd started it up, the runway and the sky were all mine. No one wanted to miss *this* flight! (These jets tend to do that to people, even after the hundredth flight.) Takeoff was nice and smooth. It climbed out like any of my pattern ships and, with just a touch of elevator trim, it was flying straight and level.

After a few of the low-levels, I was very comfortable with the plane, but this was a test flight, so I slowed down to see what kind of envelope I was working with for landing. I had nothing to worry about; this ship slows down and lands great.

Overall, the A-4 is an outstanding value. It goes very fast, but doesn't scare you in the process. Some of the jets are so fast that for the first 10 or so flights, their pilots keep them up in the jet stream. (Cost may be a factor in a lot of those.)

The thing that impresses me most is that, having seen about a dozen of these fly, they *all* fly well! That's with regular folks like you and me building and flying them, not factory reps, or sponsored airshow teams. There's one sport jet out there that has to be highly modified to fly well, and other problems have been passed off by the manufacturer as building defects.

If you're itching to give jets a try, this is a good place to start. I've already started on my second A-4 (this one for scale), and I'm waiting for other single-engine releases from these folks! ■



On final approach, the Sport Hornet is very stable. Pusher prop is invisible in flight.

IT WAS LOVE AT first sight. I just *had* to have my own Hornet. The leading-edge extensions and canted twin fins of this modern gunfighter haunted my dreams. I knew it was only a matter of time before a kit manufacturer would start producing F-18s and I'd be tearing up the sky with my own pocket rocket.

For five long years, I looked through hobby magazines expecting to see a full-page ad from someone kitting the Hornet. During that time, I kept busy building everything from sailplanes to pylon racers and increasing my knowledge of things aeronautical. One evening, I came across some excellent three-views of the Hornet. After some quick calculations and measurements, I found myself at the drafting table, scaling up the three-view on a blank piece of vellum. The pencil and T-square blurred before my eyes as I started the major outlines and my frenzied pace continued throughout the night as my expectations grew. For the O.S. 25 to show its true potential, lightness was very important, so I took great care not to overbuild. At dawn, I emerged from the shop with a rough set of drawings. I was finally going to



S P O R T

HORNET

by RICK JAMES

A "pocket-sized"
scale pseudo-jet for the sport flier.

have my very own F-18 Hornet!

First Flight

Hornet Prototype No. 1 flew for exactly 4.5 seconds before destroying itself on the tarmac. That's when I remembered that the pilots of full-size fighters don't actually *fly* these high-performance birds. Apparently

all *their* control inputs are first fed into a computer that decides how much control-surface deflection is required for prevailing flight conditions. Had I built an unflyable model? That would explain why no one had kitted the design.

I salvaged the radio and engine and returned home to contemplate what had happened. The prototype had plenty of thrust—Halley's Comet couldn't hold a candle to it—but, with the application of elevator to break the surly bonds, the craft wasn't stable in any axis. This was obviously a case of severe aft center of gravity. I decided to make a small hand-chuck glider to check for instability. The glider's first flights were much the same as those of the prototype, but without the damage and heartbreak. I kept adding nose weight until that magical toss when it sailed gracefully across my neighbor's fence. Finally, success came with the balance point at 15-percent wing



U.S. Navy "Blue Angels" demo-team scheme is very attractive, simple and highly visible.

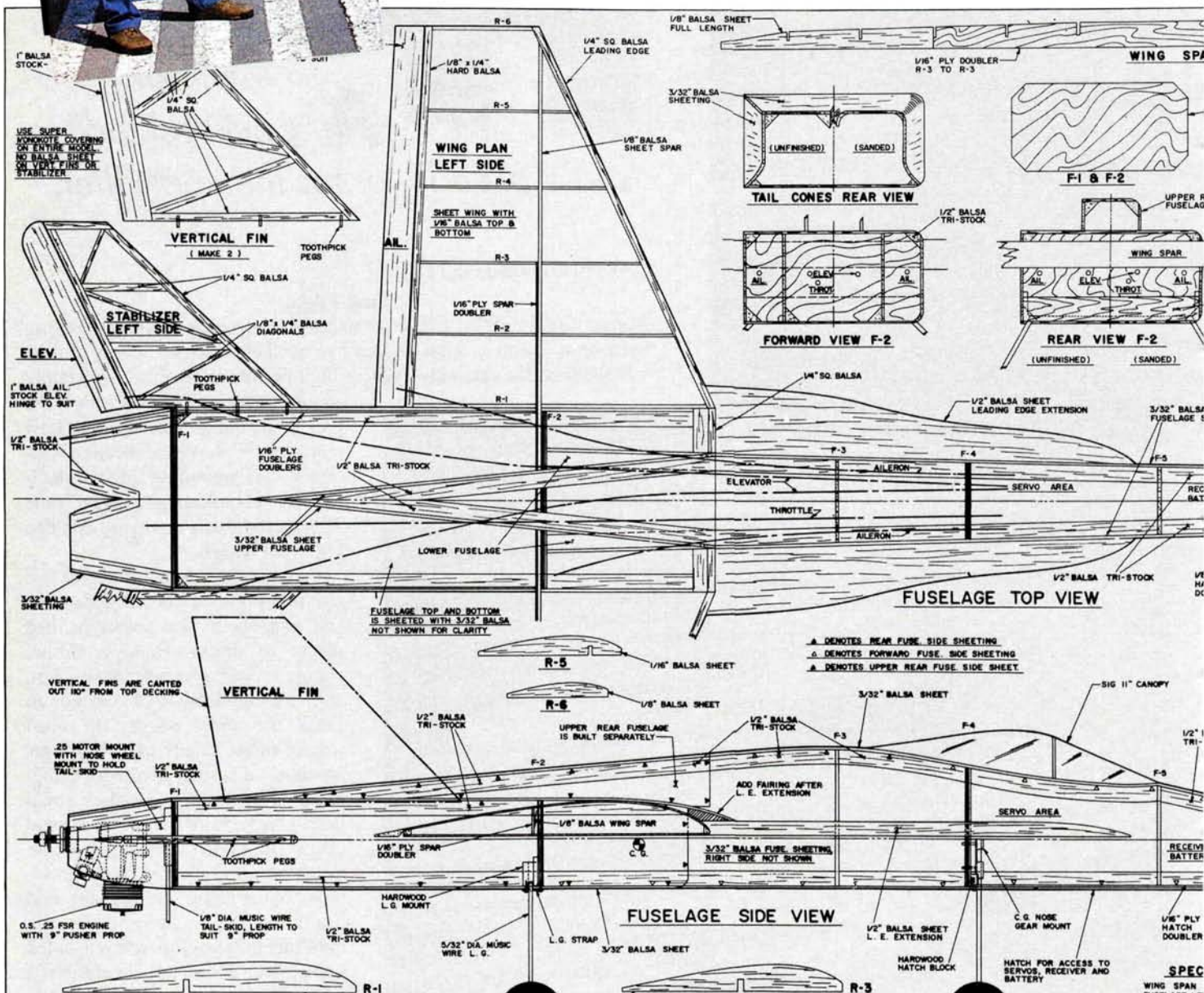
A man with a beard, wearing a blue flight suit with patches and a matching cap, stands on a paved runway. He is holding a large, blue and yellow model airplane. The background features a range of mountains with snow-capped peaks under a clear sky. The image is framed by a black border.

Designer/builder Rick James with his latest project. Although it's a one-piece airplane, its size makes transportation easy.



Top view of fuselage prior to wing attachment shows bulkheads, control-rod routing

chord. It appeared that the Leading Edge Extensions (LEX) contributed greatly to the total lift, hence the forward CG. That evening, I began construction of Hornet Prototype No. 2. A word of warning: This isn't a plane for a novice pilot. The plane's maneuverability is the same as that of any pattern aircraft, but its speed makes it



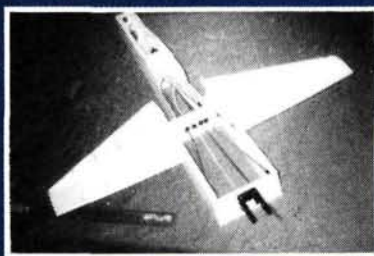
\$11.50

This great-looking sport flier captures the look of the Navy's F/A-18 Hornet in a .25-size airplane. The engine is mounted at the aft end of the fuselage and uses a pusher prop rather than a ducted fan for propulsion. Very easy to build using conventional materials like balsa and ply, the Sport Hornet, because of its spritely performance, is recommended for the intermediate level R/C flier. 32-inch wingspan, 36 inches long. One sheet plan.

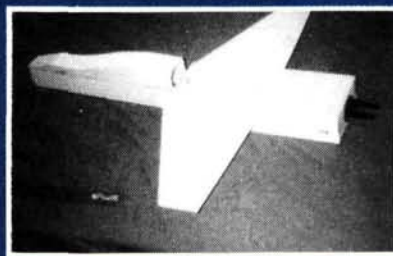
SPEC



Trial-fitting of wing to fuselage. Triangle stock aids in rounding off basic shape of "box" structure.



True impression of basic box structure is evident here. Makes for simple building, problem-free alignment.



Wing is permanently attached to fuselage at this point. Upper fuselage sheeting in cockpit area has been added.

unsuitable for training.

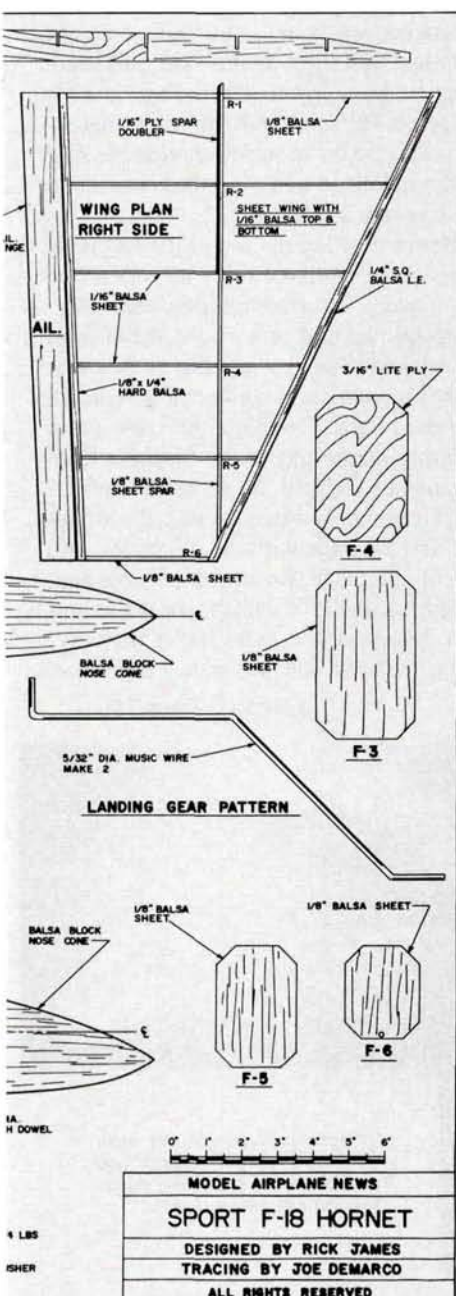
Here's the equipment that you'll need: an O.S.* .25 FSR or equivalent; a Perry* pump (owing to tank location); a motor mount (with a hole for a nose gear strut that will be used as an attachment point for the tail skid/prop guard); a 4-ounce fuel tank; a 3-channel radio minimum; a

Carl Goldberg* steerable nose-gear mount; three lightweight 2 1/4-inch wheels; and a Sig* 11-inch canopy.

CONSTRUCTION: I won't go into details about the construction process, because anyone who considers themselves capable of flying a high-performance sport ship like the Hornet should already be familiar with building from plans, but, I'll explain the basic assembly sequence.

First, prepare for construction by cutting out all the bulkheads, ribs and fuselage side sheeting. These parts will make a kit from which to build and it will speed up assembly time.

Start with the fuselage, because the wing will be mated to it later. Make certain all necessary holes are drilled in the bulkheads *before* assembly, as this will be difficult, if not impossible, to do after-



"THE BEST all-around fighter ever built." That's the claim made by many when talking about McDonnell's F/A-18 Hornet. Those making the claim are also prepared to substantiate it, and this is easily done by stating the Hornet's capabilities. Although similar in appearance to Northrop's YF-17 (a competitor in the Air Force Lightweight Fighter Program of the mid '70s), the Hornet is a different airplane with a different mission. Even its designator of "F/A" lends credence to its multi-role fighter/attack design goal. While its gestation period might have been checkered with controversy (most of it in the legal arena), when push came to shove, the Hornet, from the onset of its highly visible test program, demonstrated outstanding performance. From the prototype's first flight in November 1978, which was step one in a planned 1366 production airplane buy, the Hornet continues to meet the requirement for which it was designed. The F/A-18 has found favor with our foreign friends, including Australia, Canada and Spain, but perhaps the greatest endorsement for the Hornet came when the Navy selected it as a replacement mount for the venerable A-4 Skyhawks flown by their Blue Angels demonstration team.

The best all-around fighter ever built? Maybe! An exciting airplane? No question! A genuinely challenging modeling subject? You bet! From the simple, pusher-propped Sport Hornet in this issue to Bob Fiorenze's twin ducted-fan Scale Masters-winning version, and all of the other models now available and sure to come, you can depend on a growing list of Hornet fans.

RAU ■

MODEL AIRPLANE NEWS

SPORT F-18 HORNET

DESIGNED BY RICK JAMES

TRACING BY JOE DEMARCO

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HORNET



Bottom view of LEX (Leading-Edge Extensions). Remainder of fuselage sheeting and nose block have been added.

wards. Carve the landing-gear block from hardwood or plywood laminate, then bolt and glue it to the bulkhead. Next, bolt on the nose-gear mount and the engine mount. Since all construction is done directly over the plan, protect it with wax paper or clear plastic wrap. Tack-nail small wooden blocks to your building board on either side of the bulkheads to hold them in position. Prepare the fuselage side sheeting by gluing on the 1/2-inch triangle stock. Carefully glue the side sheeting to the bulkheads while making sure that everything is aligned. Now install all control rods and the fuel line. Remove the fuselage from the building board so you can start the wing.

Prepare the wing sheeting for the upper and lower surfaces, then mark the spar and rib locations on the inside lower wing skins. Laminate the plywood spar doubler to the spar and glue it into position on the lower wing skin. Interlock all ribs onto the spar, and glue all but the root ribs. Where the wing is attached, carefully measure the outside distance between the fuselage sheeting. Check that the distance between all the root ribs is the same. When satisfied, glue the root ribs to the lower wing skin and spar, add the leading and trailing edges and sheet the top of the wings.

To accommodate the wing spar, return the fuselage to the building board and cut

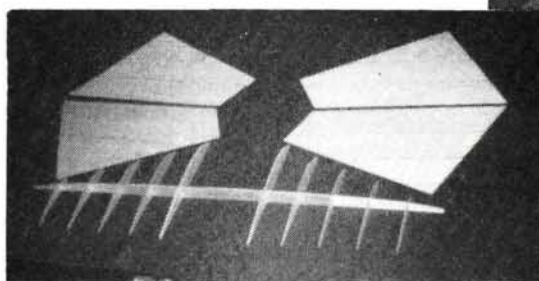
slots in the side sheeting behind bulkhead No. 2. Measure the depth of the slots off the plans and make sure both cuts are identical and tight against the bulkhead. Trial-fit the wings to the fuselage and for a perfect fit, sand and fill where necessary. When you're satisfied, glue the spar to the bulkhead and glue the root ribs to the fuselage sheeting.

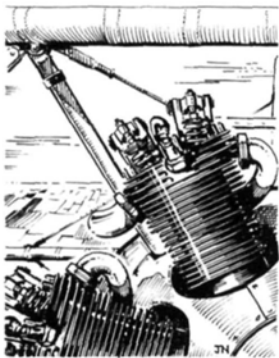
Begin sheeting the top of the fuselage, cross-grain, from the fire wall forward to the intakes. To accommodate the foam-wrapped fuel tank, cut a hole just in front of bulkhead No. 2 when the glue is dry. Install the tank and connect the vent, fill and feed lines. Complete the cross-grain sheeting on the top of the fuselage from the intakes forward. Next, build the fuel-tank hatch cover that blends the upper forward fuselage with the tail cones, and glue it into place. Invert the fuselage and, except for the radio hatch, sheet the bottom. Laminate the radio hatch with plywood and balsa and tack-glue it into place.

(Continued on page 136)



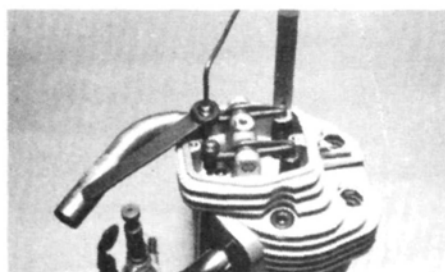
Tail-group elements are built up to save weight. Shown here ready to cover with film material. Do not balsa sheet.



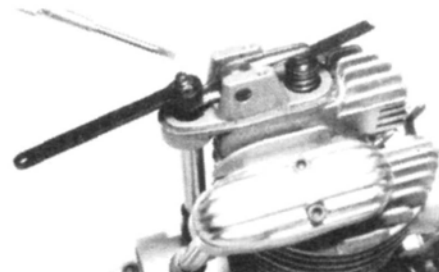


Four-Cycle Forum

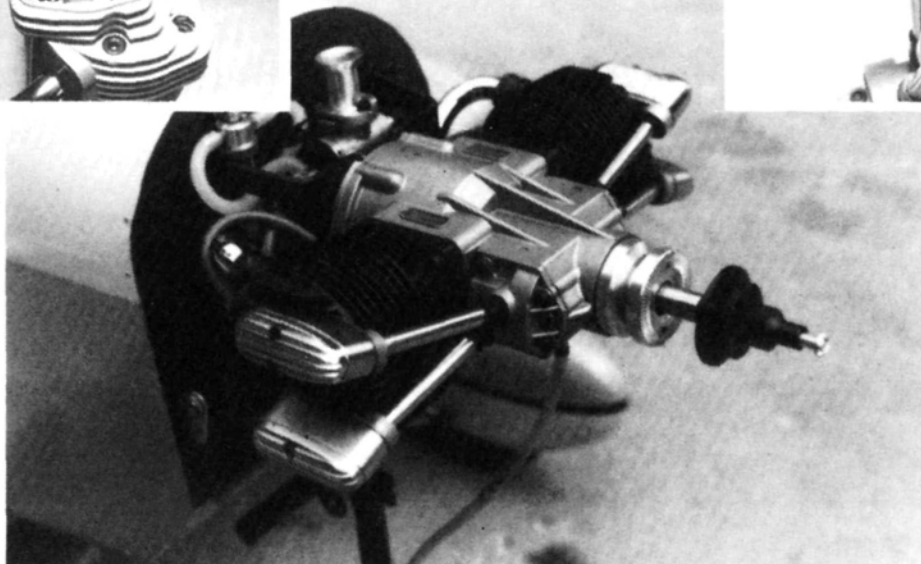
by CHRIS ABATE



Above: The O.S. FF-240 twin-valve adjustment procedure is identical to that of the single cylinder. Allen wrench used here, rather than screwdriver.



Above: The Saito FA-120 Gold Head rocker area. With cover removed, there's easy access for adjustment. Tool requirements are minimal: screwdriver, holding wrench and feeler gauges.



The Saito FA-270T: 45cc displacement, beautifully built, high-quality engine finding much favor with giant scalers.

I KNOW THAT some of you still aren't sure about the characteristics of 4-strokes, because I'm still asked questions like: Does the fuel *have* to be 4-stroke fuel, or can 2-cycle fuel be used? What type of preventive maintenance should I do? Is it a good idea to lap the valves by hand, or just to let them seat by running the engine? Is there a performance difference between 2-cycle and 4-stroke glow plugs? Is there a cooling problem with 4-strokes when they're cowled-in? If so, what's a good setup for this? And last, the most frequently asked question: How often should I adjust the valves, and is this difficult to do? This is probably the most common question, because the answer is really unknown, and it makes modelers hesitant to purchase and install a 4-stroker in their aircraft.

So what does it really take to adjust a set of valves on a 4-stroke? First, I'll tell you why valves are needed and how they

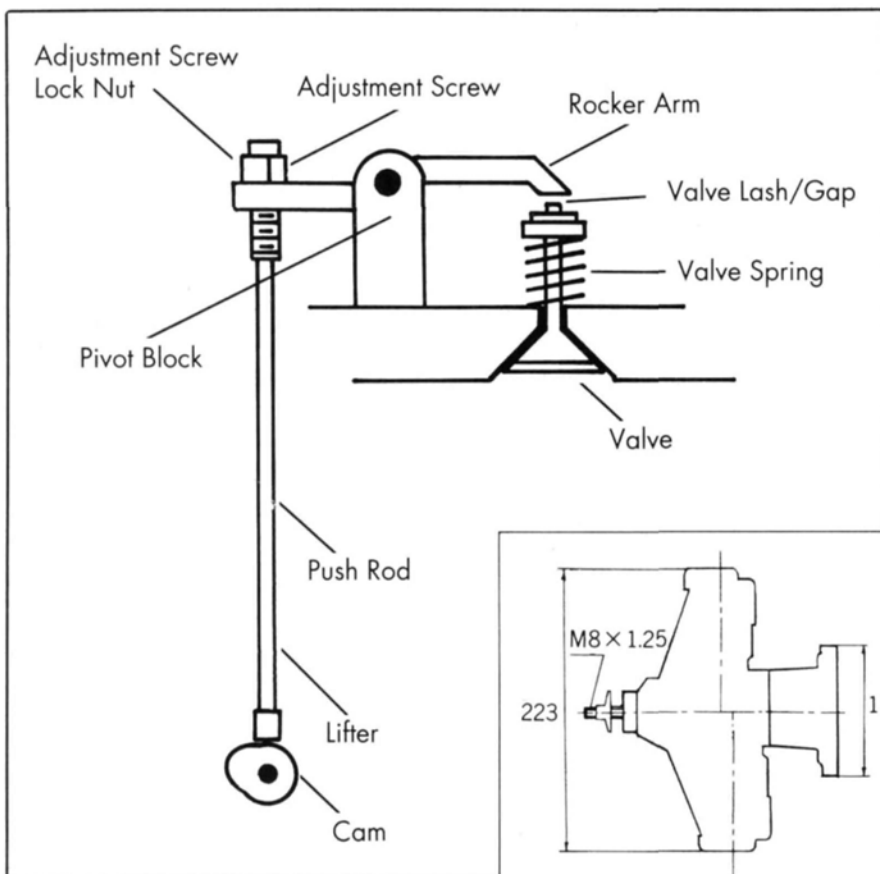
work, but since a picture is worth a thousand words, refer to the photograph as you read.

As you'll see, the cam rotates and its high side rotates toward the lifter, which in turn pushes up on the pushrod, which pushes up on one end of the rocker arm, which forces the other end down forcing the intake or exhaust-valve spring to compress and allowing the intake or exhaust valve to open. When the cam rotates off its high point, the procedure is reversed, and the valve spring forces the valves closed. Simple, huh?

So why is a gap (more frequently referred to as valve lash) needed between the rocker arm and the valve stem? To ensure that the valve can fully seat and also to ensure that the valve starts to open on time and then closes on time. This, of course, is tied into the timing of the engine, and that's why manufacturers specify a certain gap range for a particular

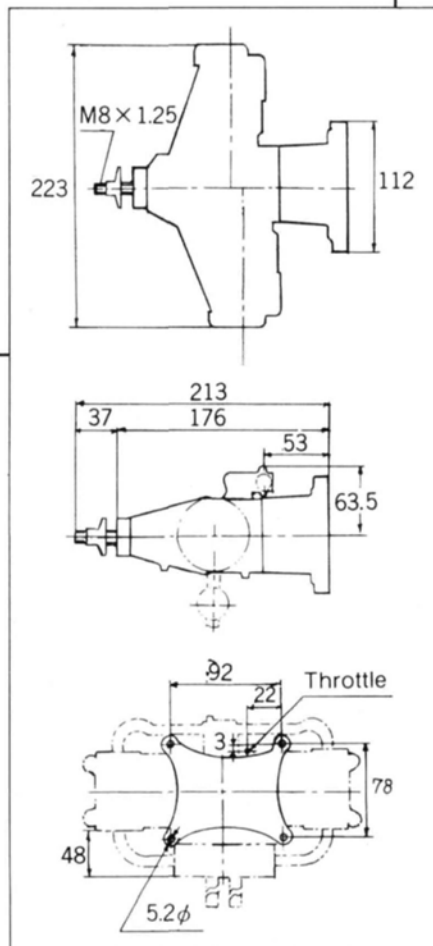
engine. Say, for example, that the gap needed is .030. If you were to set the gap at .015, the valve would open too soon, because the rocker arm has a shorter distance to travel before contacting the valve stem. Distance can be related to time and travel, and in this case, you'd be advancing the timing of the valve opening. Now if you were to set the gap at .045, you'd retard the timing of the valve opening, and it would take longer for the rocker arm to contact the valve stem and push it open. Now, to go to extremes in either case could result in the valves *never* closing or *never* opening. Checking the valve lash isn't complicated, and procedures for doing it are spelled out in the instruction book that comes with an engine.

This is the basic procedure: Remove the rocker arm/valve cover; turn the prop over in its proper rotation until compression is felt; turn one quarter of a turn more. In this position, both valves should be



This illustration depicts the components of a typical 4-stroke engine that are affected by the adjustment process.

closed. Now follow the manufacturer's recommended valve clearance with the feeler gauges supplied. It's usually best to set the clearances with the engine cold. Check the gap, and if it's OK, put the valve covers back on and go fly. If you find the gap "off," loosen the locknut on the rocker arm just enough to allow the adjusting screw to turn. Rotating the adjusting screw counterclockwise will open the gap, and clockwise rotation will close the gap. This procedure is by trial and error. The adjustment screw should be turned only slightly each time. (It's very sensitive.) After the adjustment, lock the locknut and turn the prop a couple of times by hand. (I think it goes without



Usable dimensions for the Saito FA-270T, all shown in millimeters.

saying that you *shouldn't* have the glow plug hooked up!) Recheck the gap. If it isn't to specifications, repeat the procedure.

Once you do this, you'll see that it takes only minutes to make valve adjustments. Although valve clearance is set at the factory, it doesn't hurt to check this before running your engine for the first time. I usually run an engine for about a hour before I check the clearance, and you'll probably find that an adjustment is needed because the parts break-in gradually. I've heard it said that the valves in 4-strokers need adjusting regularly. My only answer is that someone didn't properly tighten the adjustment-screw locknut in the first place! Believe me, constant adjustment *isn't* necessary—perhaps those who say it *is*, just love to tinker. I've lasted an entire season without touching the adjustments.

Now, if you're wondering what you do with a multi-cylinder engine, you do *exactly* the same thing—but more than once. One more thing: Some 4-strokes, e.g., O.S., use an Allen-head adjustment screw, and some use a regular, straight, slot-head adjustment screw, e.g., Saito. In any case, make sure that the Allen wrench is fully seated, as the slot in which the wrench seats can easily be stripped.

There, that wasn't too difficult was it?

Finally, to follow up on my promise to give you information each month on a particular 4-stroker, let's look at the Saito FA-270T killer twin-cylinder:

The Saito FA-270T Engine Specifications

Bore: 32mm

Stroke: 28mm

RPM: 1,500 - 8,000

Weight: Approx. 2,200 grams/4.850 pounds



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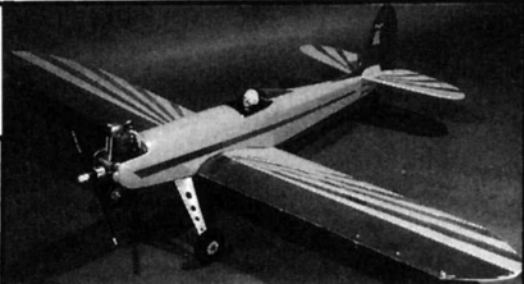


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VIOLETT VIPER

(Continued from page 67)

*Here are the addresses of the companies mentioned in this article:

Bob Violet Models, 1373 Citrus Rd., Winter Spring, FL 32708.

Loctite Corp., 18731 Cranwood Park, Cleveland, OH 44128.

Zap; distributed by Pacer Technology and Research, 1600 Dell Ave., Campbell, CA 95008.

K&B Manufacturing, 12152 Ave., Downey, CA 90241.

Bob Dively Model Aircraft, 28001 Chagrin Blvd., Suite 206, Cleveland, OH 44122. ■

BASICS OF R/C

(Continued from page 26)

lage longerons are stripped, side by side, from the same sheet of wood, they're about as close to being matched as is possible.

Adjustable strippers, like the one shown, can be used to make strips as small as 1/32-inch square and as large as 1/4x1/2 inch. When using a stripper, keep the sole of the stripper tight against the edge of the

sheet being stripped, and strip over a smooth, hard surface. The balsa stripper, along with the razor knife and the straight-edge, are essential tools.

Using grid squares is probably the oldest system of enlarging plans or parts. The idea is to cross-hatch the small plan with a series of evenly spaced squares, and then to draw another grid with larger squares (about three or four times larger). Locate points on the small plan by counting

(Continued on page 84)

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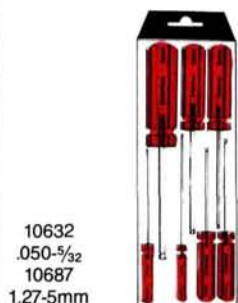
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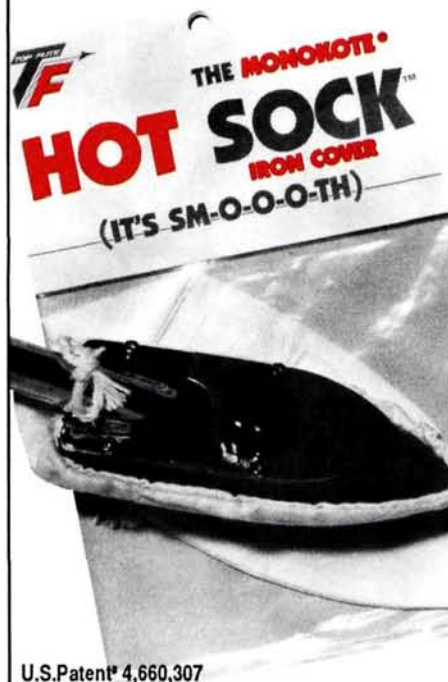


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BASICS OF R/C

(Continued from page 82)

squares and then marking them on the larger grid by counting the same way. To make the completed enlargement, connect the points on the large scale with lines or curves.

The photo shows how a small plan was enlarged four times by cross-hatching it with 1/8-inch squares and then drawing another grid with 1/2-inch squares. When a number of points had been located on the larger grid, it was a simple task to draw the new, larger plan. This system works for things like wing ribs, bulkheads and formers, as well as for whole plans.

It's a lot easier to order full-size plans from magazines, but if you're in a hurry, you can enlarge the reduced-scale plans that are included with construction plans, and this provides the size of the grid squares necessary to enlarge the plan to full size. A drawing board, a T-square and a triangle are the essential tools for this facet of the hobby.

Just about every technique used in building and flying R/C aircraft is old! A lot of them come from the full-scale aircraft industry, which in turn got them from carpentry, cabinet-making and sewing, among others. Radio itself was used to control aircraft as long ago as the very early 1900s. Someone once said "there's nothing new under the sun" and they were almost right!

JETS

(Continued from page 32)

tonomous, to a certain extent), the Feds reportedly require a pilot to have 500 hours of prior jet time before flying many of these jets. That's interesting, considering that a military pilot starts flying jet fighters with something in the neighborhood of 160 hours. Some sort of requirement makes sense; the goal, however, should be to produce *safe* operations, not to regulate certain types of airplanes out of the air.

Of course, the insurance companies go into cardiac arrest at the thought of a civilian flying a jet. Never mind that the reliability record of a jet engine against a recip is much, much better. Amazingly, increasing numbers of pilots are simply telling the insurance companies to "drop dead" and taking off for the wild blue. Insurance agents are having trouble coping with the fact that they aren't as indispensable as they thought they were.

We're at the threshold of a really inter-

(Continued on page 95)

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SUPERSONICS PREDATOR



PHOTOS BY BOBBY ZIEGER AND MIKE KUJCZYK

A BALSA-AND-FOAM SPORT JET FOR THE "SMALL BLOCK" ENGINE/FAN COMBO

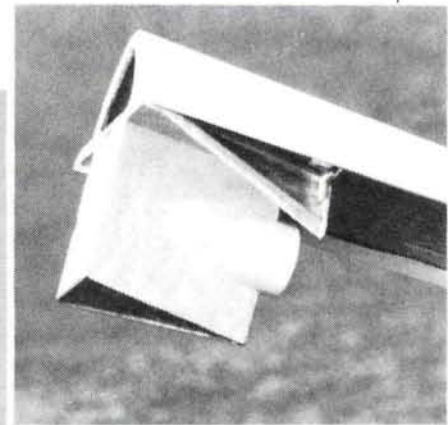
by BOBBY ZIEGER

WEBSTER'S DICTIONARY DEFINES a predator as "an organism that lives by preying on other animals"...sharks maybe?...sport type?...I was recently given an opportunity to find out if Super Sonics'* Predator would really "eat 'em alive." It gets close, but not very.

I think the model was designed to give inexperienced fliers an introduction to ducted-fan flying without

having to make a very heavy investment in time or money. To some degree, it satisfies this requirement, but I hesitate to recommend this kit to a relatively inexperienced builder or flier. During construction, the builder is required to make many judgment calls, which only experienced modelers would be able to make correctly.

THE KIT: When I examined the kit, all the necessary ingredients



Inlet ducting is permanently attached to removable hatch. Streamlined fairing blends to fan rotor, replaces spinner.

SPECIFICATIONS

Type: Sport jet

Span: 54 inches

Weight: 8 1/2 ounces

Area: 634 square inches

Wing Loading: 31 ounces per square foot

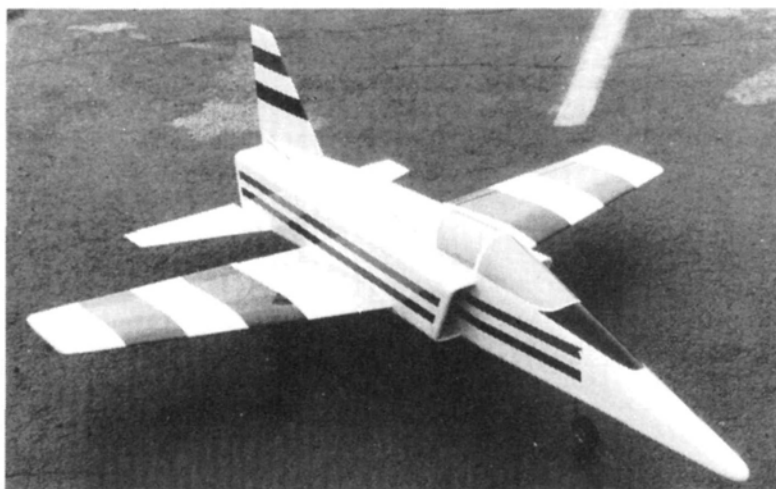
Power Required: .45 to .77 (with appropriate fan unit)

Number of Channels Required: 5 with retracts

Suggested Retail Price: \$99.95

Features: Balsa/ply fuselage and tail group with foam wing cores. Retracts optional. Construction manual.

Comments: Good first ducted-fan project, but not for novice builder. Smooth flier with good low-speed control. With the O.S. 46/Turbax I power package, could be considered a "Sunday flier."



Predator's angular look is dictated by using straight, rather than "swoopy," lines to create fuselage shape. Effective and simple, if not ultra-pretty!

seemed to be in place, but on closely examining the plans, I saw several errors that could mislead a less experienced builder. The plan shows the fuel tank installed reversed, i.e., front to back. If installed like this, the fuel pickup clunk would be at the front of the tank, and this would lead to fuel starvation under acceleration. The wing planform, as shown, doesn't account for the angled sides of the fuselage. The spar cutouts in the foam cores are at 90 degrees to the wing root. If the cores aren't trimmed to match the fuselage contour before installation, you'll either have swept-back wings or place an unnecessary strain on the stub spars, which are a part of the main structural bulkhead. The illustrations showing the locations of the fixed landing gear and the

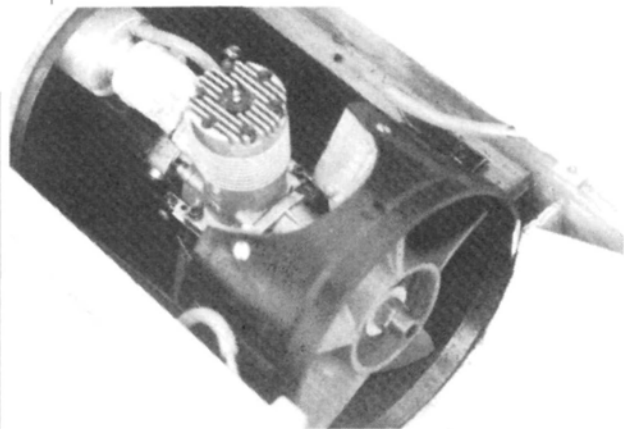
retractable landing gear aren't accurate; the fixed-gear position would be further aft by approximately 1 inch.

An illustration booklet with an addendum is provided to lead builders through the construction sequence. These instructions are printed in script, which, although readable, doesn't generate any warm feelings about the professionalism of the product. Numerous typographical errors further degrade this effort. The instructions describe the fabrication of a "header" fuel tank to ensure good fuel flow to the engine. In my opinion, this effort is unnecessary, as long as the main fuel tank is properly installed to begin with. The use of a Perry pump is also discussed. Here again, the pump might have been

suggested as a compensation for a discrepant fuel system. Generally, the construction sequence can be followed successfully, but aileron construction wasn't part of the wing buildup and appeared to have been added as an afterthought.

Further, nowhere in the instruction manual or on the plan is there any discussion of control-surface throws, and this information is essential, at least for *initial* flight testing, even though modifications will probably be necessary later, at the pilot's discretion.

The most disappointing feature of the kit is probably the quality of the materials provided. This particular kit was one of the first produced, so perhaps this drawback has been cor-



Close-up of Turbax I installation shows substantial area removed from shroud to assist cooling. Spinner was removed from rotor to reduce vibration.



With the hatch removed, access to fan unit and engine is excellent. Needle valve adjustment is via ball driver through shroud.

PREDATOR



inch ply would suffice. The instructions should tell you that it would be prudent to temporarily mount the fan shroud in the fuselage during construction and handling to provide some stiffness to that bulkhead, since it's quite narrow in cross-section across the bottom.

For personal reasons, I made some cosmetic changes to the airframe, but I'm sure the airplane will perform equally well if built exactly according to the instructions. I modified the inlets to a semi-F-15 configuration to give what I think is a sexier look and also to improve air inflow at high angles of attack. The height of the turtle deck was reduced at the rear of the fuselage to decrease the boat-tail area and drag. (Several square inches were saved.)

Vinyl and Mylar film are included in the kit for use as an inlet-duct liner, inlet-to-fan shroud transition and tail-pipe ducting. After several evenings' effort, I gave up on the plastic materials; I lined the inlets with $1/32$ -inch balsa and substituted a ready-made fiberglass tail-pipe. I constructed a duct splitter assembly and transition liner, which is

attached to the hatch and controls the airflow between the inlet-duct exit and the face of the fan shroud. (The photos show this more clearly than I can describe.) A center-body fairing for the Turbax unit was also added. My standard procedure is to operate the Turbax *without* the fan spinner to reduce vibration. Provision is then made to provide a fairing in the inlet that controls airflow around the fan hub.

The elevator chord was increased from 1.5 to 2 inches, and the aileron chord was increased from 1 inch to 1.5 inches. It should also be noted that if retractors are to be installed, standard Rhom or B&D main-gear units are too tall for the wing, but the Rhom FAI unit works well. The nose gear is a Rhom fire-wall mount rigged to retract forward.

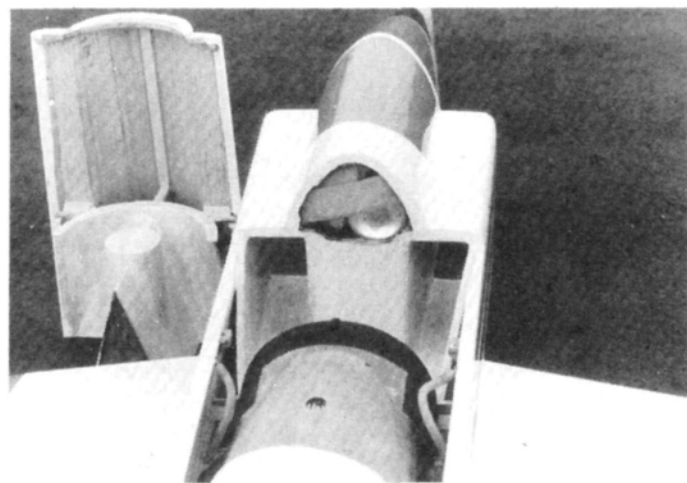
In the instruction manual, there's a discussion about suitable engine choices for ducted fans. We're told that there's no advantage to installing a larger engine in a particular fan unit if it won't turn any higher rpm. I agree with that. Thrust is dependent on rpm, and if a .46 will do the job, why install a .60?

PERFORMANCE: The airplane flies great! It isn't especially fast, but it has good vertical performance. It flies smoothly, has a good roll rate and no bad

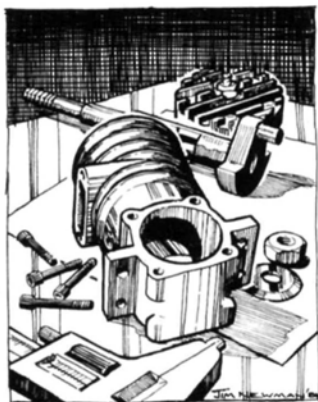
habits that I've been able to uncover. As I've already said, the Predator isn't a good first-time fan model for inexperienced builders, but it is a solid choice for any modeler who has some ducted-fan building experience; he can either build it according to the instructions, or modify to his heart's content.

**Here's the address of the manufacturer featured in this article:
Super Sonics, P.O. Box
691810, Tulsa, OK 74169.*

rected in later models. The $3/16$ -inch plywood bulkheads were poorly cut: Most weren't symmetrical about the vertical center line, with errors of as much as $1/8$ inch. Some of the 36-inch balsa sheets measured only $35 7/8$ inches. While this isn't a *major* problem, I had to make some compensatory adjustments during construction. The foam wing cores met only minimum standards. Here again, this might have been an *early* problem, because another builder of the Predator told me that the wing cores in *his* kit were excellent. The use of $3/16$ -inch ply for fuselage bulkheads was overkill, because, with perhaps the exception of the main bulkhead, which supports the fan unit and includes the wing stub spars, $1/8$ -



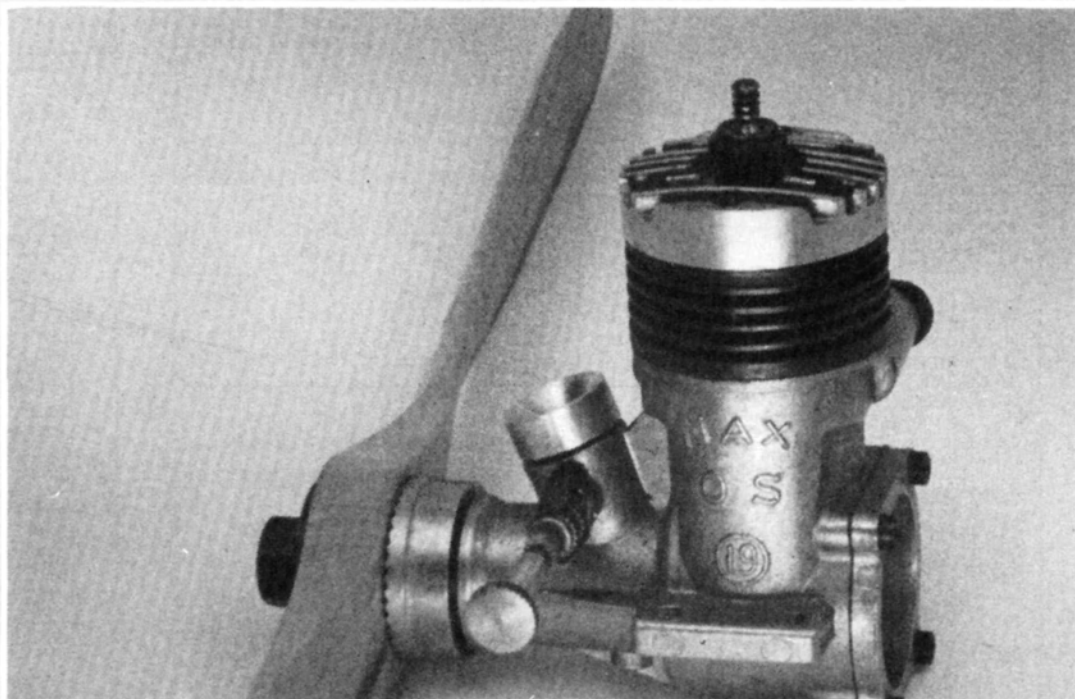
Inlet area of Predator with the hatch removed shows Turbax I fan unit and reworked inlets to smooth airflow.



About Those Eng

by JOE WAGNER

This photo doesn't show the wear-marks, but loose mounting screws once turned this O.S. Max.19 into a goopy, black mess-maker.



EVERYONE WHO OPERATES engine-powered models has occasional problems with them. For beginners and experts, motor troubles of one kind or another are always lying in wait to interfere with our fun. Some of these have obvious causes that can be easily fixed, e.g., a burnt-out glow plug or a flooded crankcase, but the most bothersome difficulties seem to occur for no reason. Everything *looks* perfectly OK, but the motor just won't run right. Sometimes, it even refuses to run at all.

I've seen a lot of these mysterious problems in the past 52 years. Although I haven't been able to solve every one (getting an OK Super 60 to run still baffles me!), most of the causes sooner or later yielded their secrets. I'll tell you about some of these problems, which could possibly make trouble for you in your model flying.

It sometimes happens that a brand-new

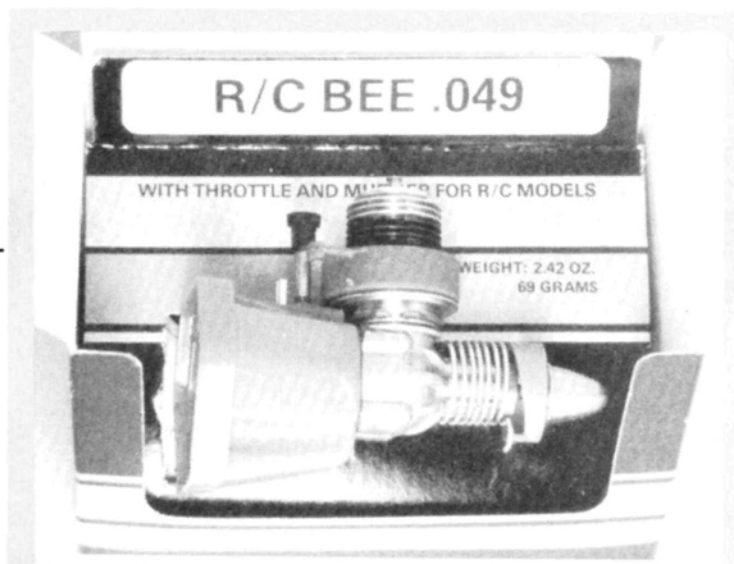
motor refuses to perform as it should because of a bad part or improper assembly. Years ago, all model engines were pre-run for a few minutes at the factory before being packaged for sale. But now, almost all mass-produced model engines are boxed for immediate shipment after being assembled. (Most of these are all right, of course.) Modern machine tools are capable of exquisite precision; far better than old-time motor makers could achieve. But no model engine manufacturer's quality control is perfect, and a faulty specimen does get out from time to time.

A friend of mine bought a brand-new Enya a couple of years ago, and it had practically no compression. Somehow, a very poorly fitted piston-sleeve assembly had been installed in this motor. The problem was obvious, and my friend phoned MRC (U.S. importers of Enya engines) about it. They immediately sent him free

replacements for the faulty parts.

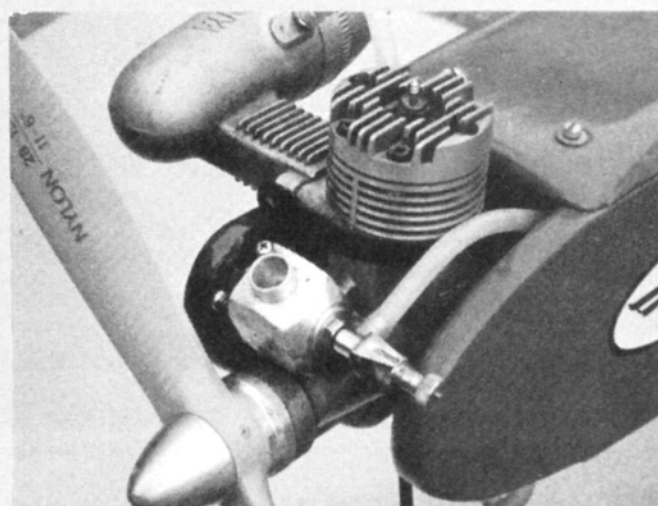
However, many flaws aren't as easily detected as that one. In recent years, I've seen a new engine with a hairline crack in its case cover; another with its needle-valve orifice clogged by a metal chip; and a third with a stripped-out threaded hole in its case that prevented one of the cylinder hold-down screws from being fully tightened. And sometimes, even when nothing seems to be wrong with any of its parts, a model motor won't run properly because of a design problem. K&B had this sort of trouble with some of its carburetors a couple of years ago. Even Cox's engine designers have made occasional mistakes: Its .049 R/C Bee of the late '70s was so troublesome that they stopped making it and modified the design into the current Dragonfly configuration.

When faced with these types of problems, it's best to let the factory fix them



*Above:
Double design weak-
nesses in Cox's R/C Bee
.049 resulted in its
being discontinued and
replaced by the
currently available
Dragonfly, which is a
far better motor.*

*Right:
The spinner nut on this
Enya .40TV
looks nice and is
convenient for
starting,
but it caused a
problem.*



All the major manufacturers have service departments staffed with highly skilled engine experts. A dud motor might get by the assembly department from time to time, but the customer service people never make that mistake.

Of course, there's no need to mail your motor back to its maker if all that's wrong is a minor fault like a metal chip that prevents a gasket from sealing. Small discrepancies of that sort are easily repaired—provided you know about them. That's why it's a good idea to give a new motor a thorough inspection before putting it into your model. Catching problems early makes them easier to fix.

Begin by removing the case cover and checking for dirt, etc., in the crankcase. Then, just to be safe, rinse the inside of the motor with copious squirts of 3-in-1 oil before re-installing the cover. Now, using a sharp screwdriver that *exactly* fits the screw slots, make sure all screws are tight. Too many model engines have bunged-up screw slots because too-small and/or rounded-over screwdriver blades have been used to turn them. Like any tool, screwdrivers wear with use. Either re-sharpen them, or throw them away and buy new ones—and not cheapies, either! The steel in "\$1.59-per-complete-set" screwdrivers is far too soft for precision work like model-engine maintenance.

Running your engine in a test stand should come next. That way, if any operational problems turn up, they'll be easily rectified: On a test stand, everything is readily accessible. I use a portable test bench that's small and light enough to be picked up while the engine on it is running. With this, I can make sure that the motor works in various attitudes, e.g., pointing straight up.

If a model engine operates well on the test stand but not in its airplane, you know the problem has to be something outside the motor: It's probably somewhere in the fuel system. I once had trouble with a Lee

Custom .19 R/C. When it had performed flawlessly for a year or two in my semi-scale Grasshopper, I began to have trouble getting a good needle setting, and the engine would sometimes stop while airborne.

Inside the plastic "clunk" tank I found the cause of my difficulties: what looked like a razor cut through one side of the silicone fuel-pickup tubing. The sharp-edged end of the brass tube to which it was fitted had sliced its way through the silicone, probably because of the vibration endured during two seasons of flying. Ever since then, I've assembled my clunk tanks differently. Around all the brass tube ends where plastic tubing connects, I first solder a ring of soft copper wire. That not only eliminates the sharp edges, but it also prevents the silicone tube from slipping off—another cause of "engine trouble" I've seen.

A loose propeller will prevent an engine from running properly. As well as providing thrust to pull an airplane

through the sky, the prop also acts as its engine's flywheel. If the propeller isn't firmly fixed to the crankshaft, the motor can't possibly develop full power. As a model engine runs, it ordinarily tends to self-tighten its prop nut. Still, once in a while, a prop can loosen anyway.

Wanting to use a propeller with an oversize center hole on his engine, a modeler I know installed a brass-tubing "reducing bushing" in the prop. Then it fit the engine shaft nicely, but the motor wouldn't run properly. The trouble resulted from the bushing being slightly too long. When the prop nut was tightened, the bushing prevented the drive washers from clamping firmly enough against the propeller hub. They did develop sufficient friction so the engine felt normal when flipped, but during running, the slippage between the prop and its drive washers seriously reduced the motor's power output.

Another R/C flier equipped his Enya

(Continued on page 140)



Giant Steps

by DICK PHILLIPS



When placed in an appropriate setting, well-done model of Stinson Voyager is difficult to tell from the real thing.

IN LAST MONTH'S COLUMN, I mentioned that scale modelers are really students of the past, because they aim to recreate recent history with their modern jets, and rather more distant history, with classic or antique airplanes. To be competitive, a model must be an accurate rendition of a specific airplane. The scores earned in scale contests will depend on how well the model imitates the look of the original airplane and how well the model's pilot is able to duplicate its flight.

What does this mean to a modeler who

wants to build good, scale models, whether for competition or just for fun? It means that the scale model must be started in the *right* place, and that place is the search for accurate documentation.

How many times has a builder produced a fine-looking model that flies so well that his clubmates convince him to enter it in a local scale contest? He digs up what documentation he can find and enters the contest, but he doesn't win prizes in well-judged contests because he usually lacks *good* documentation. When I was a judge at a Canadian Scale Nats, one modeler offered as documentation a book on his particular airplane with a bookmark indicating a photograph of the airplane, but *not* the one being judged in the Nats! Obviously, his model didn't do well.

Building a model and *then* finding documentation with which to support it is like putting the cart before the horse. The best (in fact, the only) way to build contest-class scale models is by finding the documentation *first* and then building the model according to the material. (This applies to any good scale model, whether



Well-done Bucker Jungmeister duplicates a flight that's becoming rarer as more and more full-scale BUCKERS disappear. Impossible to tell from full-scale plane at a distance.



1/2-scale Pitts structure imitates full-scale exactly. All structural members are placed as on the original. Model was built from plans intended for full-scale airplane.

intended for competition or not.)

Of course, any model's scale accuracy is determined by the builder. If he only wants a model that's easily recognizable as the original, then he decides what, if any, documentation he needs. (Generic scale?) If the model is to be entered in competition or is to be museum scale, then a good deal more work is required on the documentation.

When it comes to information on their favorite airplanes, most scale modelers are



Paul Butcher's "String-bag" sports torpedo and, like the original, has folding wings. Here again, documentation and attention to detail have produced a model close to museum scale.

pack rats, and they have collections of materials about models on their "someday" lists. Some of these collections (including my own) date back many years and have an excess of information. When the model's construction is imminent, the material to be used for the model is winnowed down to the pertinent items. If any structural changes are required in the plan to accommodate the documentation, these changes can be made *before* construction begins, which is a lot easier than having to make them after you've started.



Model is hard to tell from the full-scale version when properly detailed. Even the background could be a hangar.

Sources for scale documentation are legion, and I won't even try to scratch the surface of that subject. Material is available in many areas, some not very well-known. There are museums by the score (including NASM and Wright Patterson), airplane-specific clubs (Waco and Beechcraft Staggerwing), generic associations (Antique Airplane Association and OX-5 Club) and many, many others. The real trick is asking for the needed information in the right place. In addition to "active" sources such as those mentioned, there are literally thousands of books on a variety of airplanes. Photographs, three-view drawings and other materials are also available. The real skill isn't finding

enough material, but rather weeding out that which *doesn't* apply.

Now, all this is OK for well-known airplanes and even for some of the more exotic birds, but some airplanes require a *lot* of digging before you'll find good documentation material. The ingenuity of the researcher determines where the digging will be done. A number of specialists are willing to help, but if you write to one of the experts, be sure to enclose a self-addressed, stamped envelope, because some won't even respond if you don't, and who can blame them?

Be careful how you ask for help and what you ask for. A letter asking for "everything you have on the B-25" is *not* likely to get much of a response, because it implies that the writer is too lazy to do his own research and wants someone to do it for him. (Anyone who couldn't find a great deal of information on the B-25 without help isn't really trying!) However, if you've worked yourself into a corner on a specific airplane and need help, a well-phrased request to the right party might provide the material you need.

In the case of older airplanes, there might not be any color documentation, and here, you're on your own. You'll have to rely on published information or color photos of restorations or replicas. (There's nothing wrong with documenting your model after a replica, and if it's a full-scale airplane that flies, you're in business.) In addition, many antique and classic airplanes were painted or doped with commercial products, some of which are still available. If the manufacturer of the dope sells the same color today, no judge in his right mind would question the authenticity of the color.

I'm suggesting that you use every effort to find documentation on your own. If that fails, try to find help. If that, too, fails, maybe you'd better choose a differ-

ent airplane to model. (If your choice is so esoteric, use whatever you can find, because it's unlikely that anyone else will know as much about the bird as you do!)

Documentation for a contest model is specified in the rules for specific types of competition, so the builder is restricted to how much and of what kind. However, there are options available. One that comes to mind has been used by a scale modeler to document the maneuvers of which his model is capable. He made up a separate sheet detailing the capabilities of the original, then had it certified as correct by a recognized authority on the airplane. He takes copies of this sheet to contests and presents one to the flight-line



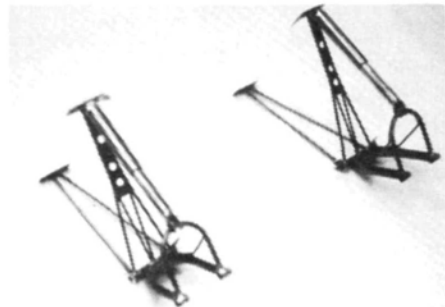
Beautiful float-equipped model by Canadian Paul Butcher shows what can be done when a modeler puts his mind to it.

judges just before a flight. He makes a point of describing the maneuvers he intends to use in his presentation, and he shows the judges how the prototype would do them. When he flies, he does exactly what he said he would, and the judges have to award him high scores. Remember that such a process requires a knowledge of the original airplane and the ability to fly the model appropriately.

Successful competitive scale modelers are both good builders and excellent fliers,

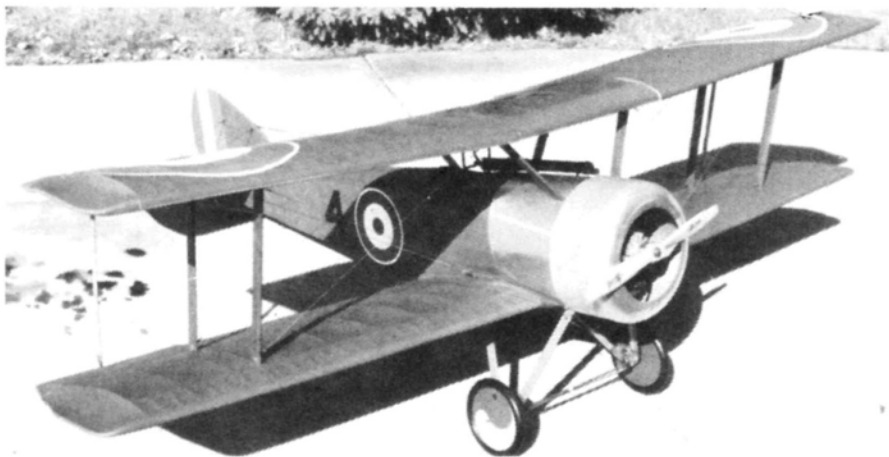
GIANT STEPS

and this combination of skills isn't found in everyone. Many excellent fliers aren't great builders, and the reverse is also often true. Those who are able to build great models and fly them well are few and far between. For the builder who doesn't fly well, there *is* a solution: *practice*. It's a



Attention to detail includes such time-consuming touches as building these landing-gear struts. Good documentation and skilled workmanship team up to produce these excellent assemblies.

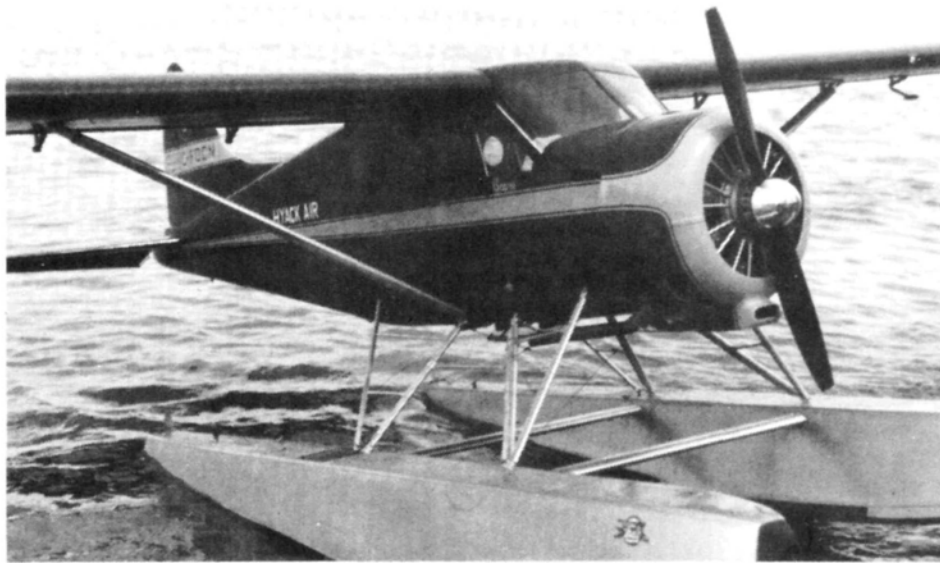
truism in scale modeling that the superb scale model is often "saved" for the competition. This then means that the flier is reluctant to practice with the model for fear of losing it in a practice accident. It's a real "Catch 22" situation: Fly it to improve your flying and risk its loss, or save it for competition and fail to get the needed practice.



Scale can run the gamut from stand-off (above) to super detailed models. Sopwith Pup from Balsa USA kit is very much a "plain vanilla" version with little detail.

There isn't an easy answer to that Catch 22 problem (is there ever?), but there are ways to get around it. Fly a model that performs like the contest model *often*. Most builders have a back-up model to ensure that they have something to fly in the event of an accident with their "first string" contest model. Using the back-up for practice flying will help hone those needed skills.

Building two identical models at the



This DeHavilland Beaver is difficult to tell from full scale. (Note the scale waves!). Model copies full-size Beaver, which flies off water in the background.

same time is another way to gain the necessary skills. It's always less trouble to build two identical models concurrently than consecutively. Parts can be stacked and two items cut at one time. One of the models will have a bit of an "edge" on the other, but they'll fly similarly.

I'm not suggesting that you build two super-detailed models of the same subject. Building two models alike, detailing one for competition and leaving the other without full details is the way to go. The "practice" model should be weighted to

contest model in practice sessions.

Practice sessions should be structured just like contest flights. Your caller should be there to call for you, the sequence of maneuvers should be the same, and the regimen shouldn't vary from contest format. In this way, all flights (contest or practice) will be identical, and by repeatedly flying the contest sequence, you'll become familiar with the routine, and this will lead to better flight scores.

After a contest, get together with your caller and critique your flights and scores. If you know what went wrong, practice to cure the problem, and you'll do better next time. (Remember that what turns a judge's crank this week, might *not* at the next contest.) Don't be afraid to ask the judges what they were looking for and to ask what you could have done to gain better scores. (Do this *after* the contest, of course!) Most judges will be quite happy to give you the benefit of their experience.

One other factor will affect scale scoring: choice of subject. It's a well-known fact of scale-contest life that many judges are turned on by fast WW II fighters, and these models do better than less striking models. A moderately well-done P-51 will usually do better than a superbly executed Piper J-3 Cub. Sorry, but that's a fact. Less well-known airplanes, well done, will often do better than equally good but more widely recognized airplanes. Scale modeling is a bit of a crapshoot in that respect, so choose something you can be comfortable with, enjoy building and flying, and go with it. One more thing: If your bird doesn't do well this weekend, it could still be number one *next* week. That's the way scale works. Good luck! ■

perform as the detailed model does. (A well-detailed scale model always weighs more than a plain "vanilla" model of the same subject.) Given the same weight, power and configuration, two models so built should perform very much the same. By using this method, you'll be able to practice with a model that performs like the contest version. Using the less important of the two models also removes some of the pressure you feel when flying the

(Continued from page 84)

esting, exciting era, because we're witnessing either the birth or the death of something potentially big. Since there seems to be an unending flow of disposable income in the hands of those who don't care how much kerosene they burn (300 to 500 gallons an hour isn't unusual, at about \$1.50 per gallon) and the airplanes are *relatively* cheap, we might start to see some really hairy airplanes on our local ramps. On the other hand, the next major jet accident will shut down the entire thing tighter than an arthritic clam. When a Sabre crashed into an ice cream parlor in Sacramento in the late '70s, the warbird movement was nearly killed. Let's hope everyone learned from that, and the movement continues.

There are lots of reasons for the importance of the jet movement. For one thing, we're already so many generations past Korea that very few folks in their 20s have ever seen an F-86 or an F-100 off the ground. They've seen everything from Jennies to B-29s doing their three-dimensional thing, but their exposure to jets has been limited to whatever is in current inventory. When a jet goes out of inventory, it generally disappears from public view almost immediately, and who can say it's more important for us to see Mustangs than Sabres in the air? How can we forget MiG Alley or Pusan and still remember the Marianas Turkey Shoot or Schweinfurt?

The warriors of Viet Nam ("this generation's war") are also quickly fading. The F-105 Thud has already gone, as has the F-100 Super Saber, the F-101 Voodoo and the -102 and -106 Delta Darts. Unbelievably, even the old Rhino—the Phantom—is living on borrowed time, as the Navy has already taken all of its F-4s out of service. Anyone getting his driver's license in the last 10 years has no first-hand memories of any Nam fighter other than the Phantom. Now, that's sad! Really sad!

Putting airplanes like these into the air is a major operation, but, as many dedicated, bucks-up buffs have proven, it's neither impossible nor unsafe. Since we aren't likely to see a government-sponsored, aviation heritage museum like that in England, it comes back to individuals. Let's hope the FAA can find a *middle* ground that *doesn't* ground America's jet-powered past.

Meanwhile, let's luxuriate in the hot-rod syndrome gone wacko. After all ...only in America....

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Sporty Scale Technic

by FRANK TIANO

THIS MONTH, I'M gonna talk about *techniques*. If you dabble in scale models, listen up! And if you're *really* into it, there might be a thing or two here for you.

A number of scale kits still available today were, 15 years ago, considered the cat's whiskers as far as fidelity to scale is concerned. If a contestant showed up with one of these models at any contest during the late '70s or early '80s, you just knew that he would probably win the contest. I'm talking about over-the-counter kits that anyone could build and fly but that most of us stayed away from. I'm talking about the Top Flite* P-40, P-51 and P-39 (Dave Platt design), their Corsair and P-47 (designed by Dan Santich) and the Zero by Hal Parenti. And don't forget the Pica* models FW-190D-9 about which everyone asked, "A D-Whhaaat??" as well as their Spitfire and T-28. Near the end of that era, we had the Jemco* line of scale kits like the ME-109, Corsair, PT-19, P-47 and Hellcat. These were the real roots of scale competition as we now know it. Bob Violett* paved the way for ducted-fan scale with his A-4 Skyhawk,



Old kit, still great—the Platt-designed, Pica-kitted FW-190D-9. Superb flier with pattern-ship-like performance. Get those crosses perfect!

Jack Stafford and Joe Bridi gave us some twin-engine subjects, and Bob Holman* offered us some exact scale semi-kits or "plan pacs" for those with scratch-building experience.

Although designed about 15 years ago, these kits still make excellent subjects both for those who are new to scale building and those who want to improve their workshop skills. All were designed to fly extremely well, be fairly easy to build and respond very well to the application of panel lines, rivets and raised surface detailing. They provide an excellent base on which to try your airbrush weathering

skills, too. For a change, you can try your hand at *painting* the national insignias, and leave the decals alone. Perhaps you won't win a major scale contest with it, but you sure could be competitive in any "fun scale" event, and you'd probably do better than well at most local contests. Since most of these aircraft feature 60-inch spans and areas of over 600 square inches, their wing loadings are light enough to allow some really enjoyable flying.

It's only a matter of time before you pick up the techniques needed to transform your Top Flite P-39 from a simple model into a fire-breathing, tank-bustin', WW II replica. Or you can get Top Flite's or Mark's Models* Corsair and try your hand at that 3-tone navy camouflage treatment. A Pica* Spitfire can give you the chance to tackle painting roundels. Its FW-190D9 will test your accuracy in getting the German crosses painted *parallel* on the wings (a usual source of error). But if you don't like warbirds, no problem! Pica offers an easy-to-build Cessna 172 that allows for easily obtainable documentation, features tricycle gear and flies well. Great Planes* offers a Cap-20L, a Piper Tomahawk and a Corben Ace. You can find a slew of warbirds at Royal Products* and they have half-a-slew of civvy stuff, too. I know they offer a Piper Colt, a Beech Staggerwing, a Cessna 172 and a few twin-engined craft. Sig Manufacturing* can get you a Beech Bonanza, a Ryan STA and four Cubs. And if that ain't enough, try Bob Holman Plans in Cali-



The F9F-5 Cougar from the Jet Hangar kit is an attractive jet that's another great performer, especially with the new fans and engines.

fornia. His catalog contains hundreds of scale designs: everything from 36-inch single-channel planes right up to the 80-inchers that have become so popular. Best of all, these are all proven designs; many feature fiberglass cowls and plastic canopies, and most are the same size as the kits I mentioned previously, which means they'll fly on that old .60 you've had lying around for a few years!

Once you've mastered all the techniques, you can move on to bigger things, which generally means that it's a newer design, too—and this usually means that the designs are slightly more accurate. There are two main reasons for the increased scale fidelity:

- Since the airplanes are larger, they actually fly on their wings. We can use scale stabs and airfoils. They aren't simply pulled about by sheer power.
- Because we now have more reliable radio equipment and larger engines than we did 15 years ago, we feel more confident. Many of the smaller, older designs had their fuselages lengthened, their stabilizers increased in area and their dihedral increased for more stability and im-



Ex-Sterner Engineering, now Nick Zirola Models, A-7 Corsair II. Panel lines are inked; solid slab stabilizer. Still looks good.

proved flying characteristics; the larger ships, with their voluminous wings, can offer true scale outlines while remaining docile. Sure, some bigger scale models aren't dead nuts in the outline department, but as you get more experienced, you learn, or hear about, which ones can be easily modified and which ones you should stay away from. For sure, a simple blow-up from $1/7$ scale to $1/5$ scale of an



A great scratch-building subject: the Hawker Tempest built from Bob Holman plans. Generous wing; scale surfaces get close to exact scale-competition requirements.

airplane that was only marginally correct to begin with isn't a good choice!

By now, you jet honchos probably think I've forgotten all about entry-level ducted-fan-stuff. Wrong! The same panel lines, (sometimes raised rivet detailing) and the technique of painting your markings instead of using decals can be applied to models of jet aircraft. However, because there simply weren't many jet designs around 15 years ago, most of what's out there is fairly new, and most has been stretched from scale quite a bit. The cause of this is the desire for better flying qualities, room to house the fan unit, or in one manufacturer's case, the need to make the plane fit into a UPS shipping box! You can find an A-4, an A-7 and an F-4 at Jet Hangar Hobbies*. Byron Originals* offers a Sabre Jet, a MIG-15 and an F-16. Bob Holman has plans for a wide variety of designs, and Nick Zirola Models* offers a nice F-80 Shooting Star. And as you peruse the pages of your favorite model magazines (especially this issue), you'll find a few more. Just by asking around, you'll find out what's hot and what's not. Most of these planes can compete fairly well at the local level. When looking for a scale jet, notice the air inlet and exhaust outlet. If the inlets or outlets look rather large, they're probably slightly out of scale. You might also have noticed that

full-size jets don't have a cheater hole in their bellies! Start out with a slower jet (it might contain a cheater hole) and after improving your techniques, you'll be able to move up to something more sophisticated with more accurate outlines.

There are various other advantages to using one of the tried-and-proven, smaller designs as a "springboard." For one, they don't cost a lot and, two, they can utilize some relatively inexpensive hardware. Almost anyone who has ever dabbled in scale modeling will have a good running .60 around, and I'm sure that a set of Rhom retracts wouldn't be hard to come up with. No, you certainly don't have to bother with a retractable tail wheel for entry-level competition. A 6-channel radio is enough, because what else would you add other than retracts? Maybe flaps, or perhaps a bomb drop? Another bonus that results from perfecting your techniques on one of these smaller models is that, when it's time to do a Platt Spitfire or a Baker Thunderbolt (which will seem humongous by comparison), it will actually be easier, since you'll be working with bigger surfaces, wider panel lines, larger rivets, more substantial landing gear—the works!

If you're a newcomer to the art of scale modeling, you must remember one very

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SPORTY SCALE

(Continued from page 97)

important thing: For the most part, scale modeling, whether free-flight, U-control, or R/C, is really an art. We don't just slam-bang some slabs of knotty balsa together, throw on a foam wing and go hunting for a contest. First, there must be the genuine desire to model a specific airplane, then we must develop the techniques that show others we truly haven't built our latest project with a knife and fork or sanded it with a cement block. Then we must develop other artistic skills to do a good



Ikon Northwest Hawker Hurricane from glass and foam. Good starter kit. Russian color and markings are a departure from the usual R.A.F. roundels.



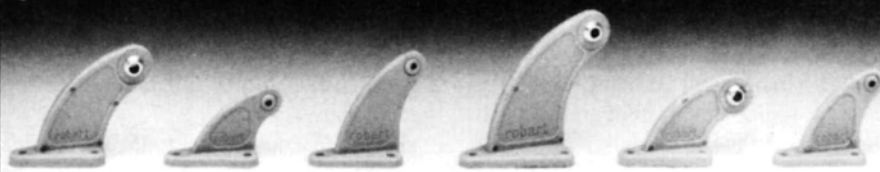
Top Flite P-47 Thunderbolt. This one went on a diet in the outline department, but it's a great flier. Good for practicing insignia and invasion-stripe application.

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paint job. We certainly don't want to be labeled as a painter who uses "only the best whisk brooms that money can buy," do we? All of this takes time, effort and a little drive, but if your building techniques could be improved, isn't it worth it? Anybody can have an average Great Planes T-28, but wouldn't an outstanding one be much better? I think so.

This month, I've given all of you a list of what you can do to further your scale skills. Next month, you'll see a new line of scale cockpit interiors and, I hope, a profile on a set of scale retracts for 1/5-scale models that are virtually indestructible, light, readily available and can be modified into 90-degree rotating units. I'll even show you how to alter the retraction to get more or less than the standard 90 degrees of travel.

Until then, keep those cards and letters

(Continued on page 144)

BYRON BULLET

(Continued from page 46)

was then permanently attached to the fuselage, followed by the addition of a balsa dorsal fin, which further stiffens things up, in addition to creating, to my eye, a more pleasing appearance. You may also kiss your "elevator" servo goodbye after installation, as it's almost inaccessible, buried below the thrust tube at the wing root, behind the fan bulkhead. The actuation linkage, however, is extremely positive, with a short, straight, tubular pushrod going directly to a full-circle aluminum yoke, to which the separate stabilizers are bolted.

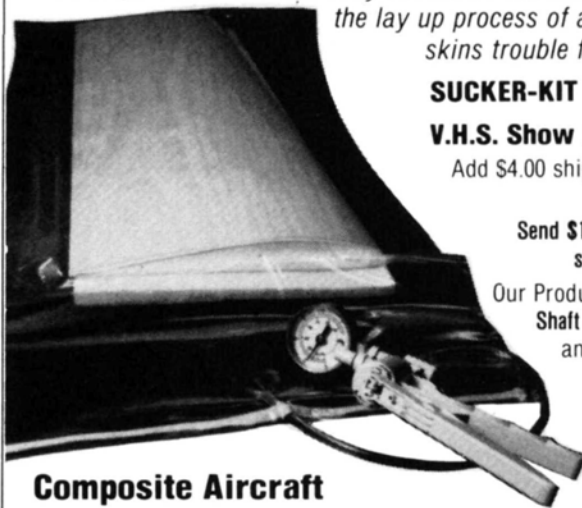
All the molded-foam parts were prepared according to the instructions and then glassed with Dan Parsons' $\frac{5}{8}$ -ounce cloth and Loctite* epoxy finishing resin. Don't use polyester for this purpose without having Byron's phone number on hand so you can order new parts, as polyester resin will handily consume the Byrofoam. The instructions recommend that you use Top Flite's* Econokote on all the molded-foam parts. This low-temp, heat-shrink material works just fine over foam, which isn't very "ding" resistant; and lightweight glass-cloth doesn't help much in this area either. A little handling care is in order.

I had the benefit of hearing about some tuned-pipe cooling problems from other modelers, so, during the building process, I incorporated some modifications into the front end of my Bullet. Since the Byrofan is a "pusher" configuration unit with the engine forward of the fan rotor, the tuned pipe goes towards the nose of the airplane, does a 180, and the exhaust is expelled alongside the engine, directly into the fan rotor and blown out the tail pipe. From a pipe-cooling standpoint, this layout works fine when the particular design of the airplane has a large nose inlet (like the MiG or the Sabre), but when side inlets, like the A-4 or Bullet, are employed, very little pipe cooling takes place, especially in a static run-up condition. To counter this problem, I incorporated an NACA-type scoop on the right forward fuselage, just aft of the nose-gear bulkhead. It provides an air-inlet source just adjacent to the pipe. In addition, I made some holes in the nose-gear bulkhead itself, and these will allow air flowing through the nose-wheel well to also reach the pipe. Byron describes a similar bulkhead mod in its October '88 newsletter. This issue also contains other Bullet-pertinent information, and I strongly recommend that you obtain a copy if you intend to build a Bullet.

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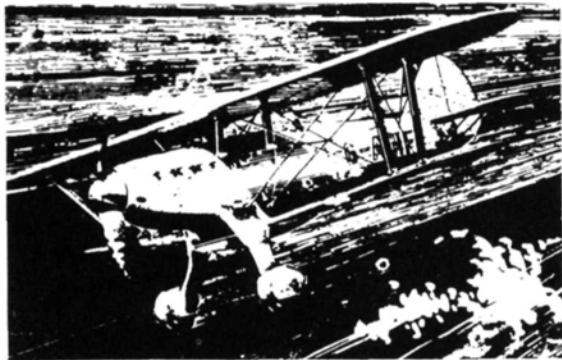
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Byron also has available, at no charge to Bullet kit owners, a full instruction and material-mod package. Unfortunately, this package will only be of value to those owners who haven't yet started building their kits. This all ties in with my earlier statement concerning the selection of the Rossi .90 as the powerplant for my Bullet. When trying to fit the tuned pipe to the installed .90, I discovered that it couldn't be set to the recommended $12\frac{5}{8}$ inches tuning length with the nose-gear bulkhead in place at the prescribed posi-

tion. It needed to be about 1 inch forward. Now this, my fellow fan fliers, isn't an easily rectifiable situation! Three options: Knock out a bulkhead you just anguished over aligning and glassing into place; move to an area of the world in which the pipe will "tune" with the Rossi at an inch or so less length; or, as I did, swap engines. I installed a no-longer-available Rossi .81, which served me well in the A-4 that I mentioned earlier. After reviewing the specs provided in the kit, it seems

(Continued on page 106)



Golden Age of

by HAL "PAPPY" deBOLT

"Mr. Orbit," Bob Dunham, with that genial winning grin! Took first place at the prestigious 1960 Detroit Invitational.

IN PREVIOUS ISSUES, I've discussed the analog system about as thoroughly as my knowledge allows. Does anyone out there have info on something that I've missed? Now let's move on to the Orbit analog, which was probably the most popular one. To appreciate the Orbit, you have to understand the man behind it and the conditions prevailing at that time.

While walking down a busy street, you'll pass people who just seem to blend into the background; they make no impression. With his sparse, reddish hair and rugged features, Bob Dunham would be one of these. Perhaps he's a "Crocodile Dundee" type who might receive a momentary glance? However, if you were to say "hello" to him, his immediate, gracious smile would make him memorable. Further, in even a casual conversation with him, you'd be impressed by this generous, understanding man. Beneath that ordinary exterior is a man of astute business ability. Never "Mr. Dunham," always just "Bob," he brought Orbit Electronics from zero to being a major manufacturer by just doing what was needed *at the right time*; and he never settled for anything less than top quality.

While there was heavy investing in reed systems, the major U.S. manufacturers (Japan had yet to come on the scene) were still just developing them. At the same time, Space Control and experiments with the digital concept showed that the future lay with proportional. The major companies were in a "damned-if-you-do and

damned-if-you-don't" situation. Development problems with digital meant that a reliable system was still years away, even though it was the way to go. In fact, any company that was prepared to "take the bull by the horns" and develop proportional would be in a most advantageous position.

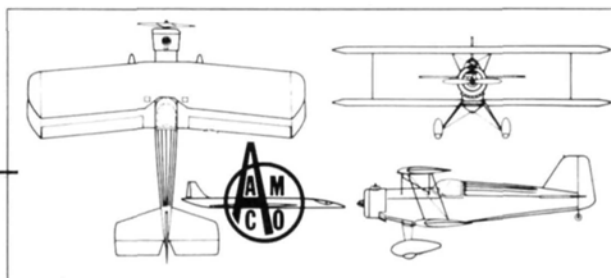
With his sixth sense, Bob Dunham fully appreciated the situation. While the Space Control system was reaching maturity, it seemed that managers *weren't*. When Space Control suddenly became available for acquisition, Bob saw a simple way to keep Orbit on the leading edge, and he quickly acquired the rights to it. A study of Space Control resulted in a decision to modify but not to change, its basic elec-

tronic design. The country was awash with reed systems, all featuring individual components interconnected with cables and connectors. Modelers were accustomed to this method. For one thing, they could arrange the components *to suit the available space* in their models. (With the "red brick," you almost had to design the model *around* the brick!) Bob's intuition led him to believe that modelers would be more comfortable with the established way of arranging the individual components. As a modeler, Bob understood their wants and needs, and "Don't upset the apple cart" might have been his philosophy.

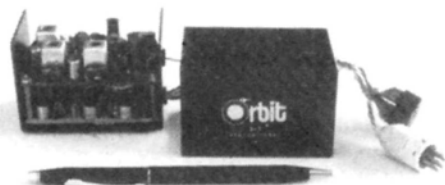
The first change made to Space Control was to its color. It would now be one



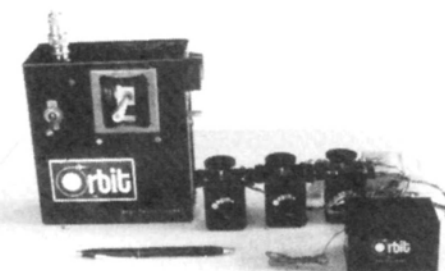
The familiar Andrews Aircraft Model Co. trademark assured quality in the early days, especially when applied to Lou Andrews' renowned "Aeromaster." Like the Stearman, it was considered a "man's airplane" with a big fat .60 in front!



of the world-renowned Orbit "black boxes." The Space Control transmitter used a simple, but effective, stick gimbal, but Orbit switched to a more sophisticated gimbal and reduced the bulky case to a more comfortable size. Perhaps the tubes in the RF section were updated with transistors and made more compatible with the coding section. Otherwise, the circuitry remained the same, and the SC transmitter did have excellent performance.



The neat Orbit 3+1 analog proportional system was readily accepted and widely used. Photo by Dr. Michael Shabot.



The two-deck Orbit analog propo receiver. Decoding on lower deck, RF on upper. Developed from Space Control. (Details in text.)

The appearance of the airborne system underwent a major change. The SC servos remained the same, but you had four separate units, as with reeds, and the wafer-style Ni-Cd battery was also separate. The former "red brick" had contained three servos, battery and receiver, so it was a pretty healthy size.

The surprise with the Orbit version was a much smaller receiver. While the depth

remained about the same, the other dimensions were much smaller, and it was perhaps only one quarter of the size of the brick. This was done by using two circuit boards, one above the other, with stand-offs. Otherwise, while there might have been some minor component changes to increase reliability, the original basic concept remained.

After a Space Control preflight, you took off, established level flight, then dialed-in the trims to lock it in. Your first flight with the Orbit would be the same: no apparent difference in reaction. However, after several flights, you became aware that the "trim drifts" associated with SC were gone. The SC hadn't really been a problem; you simply had to routinely trim, probably because of day-to-day or hour-to-hour differences in weather. With this problem eliminated, the Orbit went on to be most reliable over hundreds of flights.

One of the disadvantages of all early multi systems was cost. In the early '60s, wages were about a quarter of what they are now, and most multis cost \$500 to \$600. Few rushed out to buy them! Dunham and Orbit recognized the problem and, with their analog concept, they made an effort to remedy it.

Much everyday flying was done with less than full-house systems, and what we know today as 3-channel was common, so there seemed to be a large market for a propo system. By eliminating one channel from the analog system and making other changes, Orbit found that it could reduce the price considerably and attract more buyers. The system that evolved looked distinctive and was labeled the "3+1."

Basically, the pulsed-rudder channel was removed from the 4-channel system. There was still the fundamental analog radio for aileron, elevator and engine. The "+1" came from the suggestion that aileron and rudder should be coupled, which was popular with 3-channel systems at that time.

As with all Orbit equipment, this wasn't made a "cheapie" by cutting corners; the usual fine quality was maintained. The neat transmitter was still single-stick and even had the trim knobs and engine lever arranged for left-hand operation. The 3+1 was well-received and neatly filled a gap while digital systems were being developed.



England's Bob Ryan with an original 30-year-old Guillow ExPlorer. Took 3rd place in Fun Fly event at '87 Canadian Nats.

Looking back, it's difficult to believe that the analog period only lasted a couple of years before digital burst onto the scene. It was a tumultuous time for R/Cers. They had their reeds, and propo analog had arrived, but so had rumors of digital superiority. As a result, many never used analog, as they switched to propo only with the advent of digital. However, in our area, the Orbit analogs saw widespread use, even for years after the advent of digital. For example: Orbit was among the first to offer digital, but in the year in which it was introduced, it came too late for that season's flying. My analog was doing fine, so I opted to stay with it for that year, and near the end of the Nats, I was nicely ahead on points. On the last

(Continued on page 144)

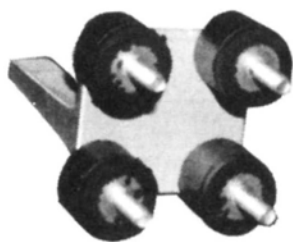
Product News



JOHN SULLIVAN "FULL-SCALE FLOAT NATS+"

John Sullivan Model Floatplane Products has announced the release of its second video: "Full-Scale Float Nats+." The 1-hour, 45-minute VHS-format tape was shot at the U.S. Seaplane Pilots' Association Full-Scale Nationals in September, 1988. The tape features a multitude of close-in, full-frame, seaplane maneuvers by everything from ultralights to amphibians, but the star of the show is a perfectly restored twin Radial Grumman Albatross shooting touch-and-gos directly in front of the camera. The video was shot with modelers in mind and includes flight sequences of R/C floatplanes as an added bonus.

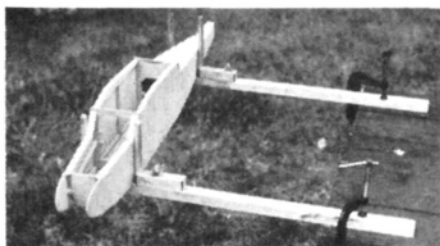
For more information, contact John Sullivan Model Floatplane Products, 1421 2nd St., Calistoga, CA 94515.



JACKSON MFG. ISOLATORS

Most engines have a vibration problem that can result in damage to the airframe, the servos and the radio equipment. In some cases, it can cause fuel to foam in the fuel tank, and this makes the engine run badly. Tests show these problems can be reduced, and sometimes eliminated, by using rubber engine-mount isolators. They're available for 40-60 and 90 engines and can be adapted to your existing mount by drilling out to a 1/4-inch hole.

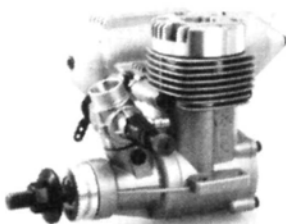
For more information, contact Jackson Mfg. Co., R.R.2, Box 81D, Edgeley, ND 58433.



HOBBIES NEW MODELER'S VISE

Modeler's helper support vise holds model planes, cars, boats and sailboats off the workbench, table, etc., for easy access when building, repairing or adjusting. Support Vises are 2 feet long and 1 inch wide; holding pins are 6 inches high; weight is 1 1/2 pounds, load-tested to 75 pounds. The vise will hold assemblies up to 20 inches wide, and of unlimited length, and it can be mounted or C-clamped to any workbench. Use when building fuselage, wings and tail assemblies, or for holding the fuselage while installing motor mounts, engines, landing gears, fuel tanks, radio equipment, pushrods, wing and tail assemblies, painting and decaling, engine run-up and general rigging.

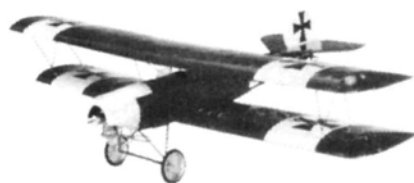
For more information, contact Hobbies New, P.O. Box 687, Minot, ND 58702.



GREAT PLANES O.S. .32 F ABC ENGINE

Fliers hoping to give their .25-size model planes extra power will find the new O.S. .32 F ABC engine ideal. Based on the popular .32 F-H ABC helicopter engine, the .32 F ABC features a highly efficient Type 3H carburetor, dual ball bearings and Schnuerle porting. Producing over 1hp, this new engine also supplies famous O.S. quality, reliability and consistent performance levels.

For more information, contact Great Planes Model Distributors, P.O. Box 4021, Champaign, IL 61820.



TOP FLITE MODELS THE ELDER BIPLANE

The look—classic. The performance—spectacular. The kit—pure Top Flite! As it leaves the flight line, you can almost feel the wind in your face and a silk scarf snapping in the breeze behind you. The Elder Biplane from Top Flite combines the thrill of aviation's most romantic era with the easy-to-build quality you expect from Top Flite. With almost 1,500 square inches of wing area, the Elder Biplane easily handles big-bore 2- and 4-stroke engines. The incredibly slow landing speeds and aerobatic capabilities make the Elder Biplane a joy to fly every time you take it up.

For more information, contact Top Flite Models, Inc., 2635 S. Wabash Ave., Chicago, IL 60616.



IKON N'WST CURTISS ROBIN

Ikon N'wst is now shipping the only scale Robin in production. Ikon's 1/5-scale 98-inch replica weighs 14 pounds, and a Curtiss Robin Challenger-powered version is also available. The Robin is powered by a 108, and performance is spectacular, with short takeoffs, steep climb-outs, and scale flight at quarter throttle. Landings are picture-perfect. All the bits and pieces for the landing gear are included, as are hand-cut parts, pre-bent landing gear, professionally inked drawings and selected wood. Building is simple and easy, because Ikon's unique method of integral construction ties the front end together in this usually difficult model. The 98-inch replica is easily transportable; the separate wings bolt onto the fuselage.

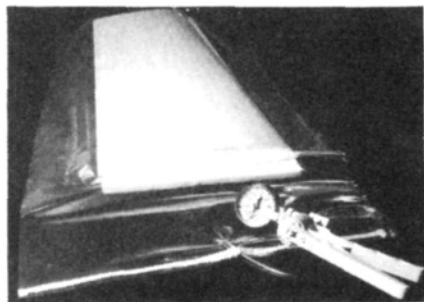
For more information, contact Ikon N'wst, P.O. Box 306, Post Falls, ID 83854.



COX HOBBIES SILHOUETTE SAILPLANE

A revolutionary sailplane concept, the Cox Silhouette combines performance, affordability, and easy 1-hour assembly with outstanding flight characteristics. The specially selected Eppler 214 airfoil and polyhedral wing, combined with a low 7.9-ounce-per-square-foot wing loading and 2-channel rudder and elevator control ensure long, soaring flights in low-lift conditions. The new, aerodynamically refined blow-molded fuselage provides exceptional wind penetration and is virtually impervious to rough landings. A High Start launching system is included.

For more information, contact Cox Hobbies Inc., 1525 E. Warner Ave., Santa Ana, CA 92705.



COMPOSITE AIRCRAFT SUCKER KIT

After four years of research and development, the Sucker Kit offers you a goof-proof method of laminating any type of skin and foam, and this cuts building time by 80 percent at a cost comparable to that of built-up wings. The Sucker Kit provides you with a manual pump and material for several wings. The "Show and Tell" video guides you through three of the most common types of wings, with a segment on our Gapless Hinge Kit. Composite Aircraft provides: wood veneers, Kevlar, Mylar, carbon fiber, a video and The Sucker Kit.

For further information, contact Composite Aircraft Engineering & Supply, P.O. Box 866, Lapeer, MI 48446.



ACE R/C ADD-A-TRICKLE

This clever device allows you to add a trickle-charge feature to any overnight charger. After the overnight charge cycle is complete, flip the switch, and the batteries receive a safe, slow, trickle-charge of approximately 10mA. They can be left on charge indefinitely without risk of damage and are always ready for use! Add-A-Trickle can be added to any fixed-rate overnight charger, and it comes in either a single or a dual configuration to match your charger's output. Add-A-Trickle is a quick, inexpensive way to upgrade your existing charger to one that can give you piece of mind.

For more information, contact Ace R/C, Inc., 116 W. 19th St., P.O. Box 511, Higginsville, MO 64037.



CRENSHAW AERO C. A. SPORTSMAN

New from Crenshaw Aero, the C. A. Sportsman is a high-quality balsa and plywood kit featuring machine-cut and sanded parts that assemble in no time. This kit also features rolled, full-size plans, hardware, and formed landing gear. It's a 60-inch-wingspan airplane for .40 to .60 two-cycle or .46 to .65 four-cycle engines, and it weighs in at 5 1/2 pounds. The Sportsman is a very stable flier and, with its symmetrical airfoil, it performs aerobatics with ease. Four channels are required.

For more information, contact Crenshaw Aero, 423 W. Washington St., Shelbyville, IN 46176.



MIDWEST PRODUCTS HOTS II

Move up to the real high performance of Midwest Products' new fun-fly model—the Hots II. Construction couldn't be easier with this new Success Series® kit. Micro-Cut Quality® wooden parts and the Success Series Construction Manual will have you out of the workshop and into the air fast. These outstanding construction features include: sturdy wing construction featuring spruce spars, spar doublers, and balsa shear webs; pre-shaped leading edges, trailing edges and ailerons; reinforced fuselage construction using aircraft plywood doublers; cleanly die-cut ribs and fuselage parts; tough, pre-bent aluminum landing gear with steel axles and nylon mounting bolts. They've designed the new Hots II using modelers' suggestions. Improvements you've asked for include: one-piece, removable, bolt-on wing; larger fuselage for easier radio installation and access; larger fuel-tank compartment for longer flight times; and a fully cowled engine for a streamlined appearance.

For more information, visit your local hobby shop today and ask for the new Midwest Hots II.

Descriptions of new products appearing in these pages were derived from press releases by the manufacturers and/or their advertising agencies. The information given here does not constitute endorsement by **Model Airplane News**, or guarantee product performance. When writing to the manufacturer about any product described here, be sure to mention that you read about it in **Model Airplane News**.

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BYRON BULLET

(Continued from page 99)

the .81 gives away less than a 1,000rpm to the .90, but the .90 requires 20-percent-nitro fuel against 5 percent for the .81 to get it. Not worth the trade in performance, plug life or reliability—not to me, anyway!

The radio installation was no problem. The throttle, retract, and rudder servos are conveniently positioned below the removable cockpit assembly. You'll need a "Y" connector to tie the two aileron servos into a common receiver channel output. You'll also need two servo-cable extensions: one each for the aileron and elevator connections. In spite of the additional servo-lead length created by the extensions, the World Engines* 7-channel Expert works fine without the incorporation of RF

chokes or noise traps. The rudder linkage needs to be as tight as you can possibly make it, and that means anchoring the Nyrod conduits along as much of their full length as possible. (I used glass-cloth and resin.)

OK, we're in the home stretch; time to start the finishing process, which, due to the high-quality glass work, takes a minimum amount of effort. I primed the Bullet with automotive lacquer primer, sanded most of it off and color-coated with lacquer. Although the Bullet isn't a scale anything, I was inclined towards a military finish, so I chose a representative SEA scheme—one that's typically worn by F-105s and F-4s. It just so happened that a squadron of Takhli, Thailand-based Thuds carried my initials as their tail codes, so I used this opportunity to personalize my Bullet. This was followed by

the application of some panel lines and insignia, and everything being sealed with two light coats of K&B* Superpoxy Satin Clear. The airplane now looked terrific, and I was really looking forward to flying it.

PERFORMANCE: Whenever the word gets out that you're going to fly, let alone test-fly, a new jet, you can always count on a crowd, and the first flight day for the Bullet was no exception. The other ingredient to this "happening" was that some folks showed up just to see if I really *did* build anything now, considering I usually show up with an ARF. Nick Ziroli Jr., Don Conrads and Frank White were the able-bodied flight-test support crew, with "first-ride" privileges going to Nick Jr. After firing up the Rossi, everything seemed to be in order, so we put it on the

(Continued on page 114)



Helicopter Foward Flight Challenge

by CRAIG HATH

IF YOU'VE been following this column for any time, you'll know that my main aim is to provide support to beginners and intermediate fliers. I give problem-solving tips or information that will, I hope, be helpful. With that in mind, it occurred to me that we should examine the training process from a slightly different perspective. I've said that I don't think a full-time instructor is necessary for one to become a competent model helicopter flier relatively quickly. For the most part, the learning experience is just that—an experience—and if that's true, then you must have the experience in order to learn from it. You won't learn to fly a model helicopter by watching an instructor fly your model. You only need an instructor for trimming your ship, showing you some basics and perhaps standing by as you attempt forward flight

“buddy-box” system, there's rarely enough time for a fledgling pilot to trade transmitters with an instructor before the helicopter crashes, so most of the flight work will be handled by the student anyway. The buddy-box system is the trainer system built into many radios. It connects two transmitters by cable; the instructor holds the “master” transmitter and the student uses the “slave” transmitter. A toggle switch must be held “on” by the instructor at the master transmitter; this activates the slave transmitter, so enabling the student to fly the model. To function together, the transmitters usually have to be of like manufacture and often have to be of the same model. Check with the manufacturer of your system for details. If you have a trainer system or an extra transmitter (or can borrow one), try using it with your instructor. This system is quite useful in allowing you to experience phases of flight that you might not be quite ready for yet.

Back to my original subject of getting good help. If you're blessed with a good instructor pilot, try not to abuse him or her. On the other hand, instructors should be careful with new pilots, too. They're very impressionable at this stage, and we often pass on our opinions to them without considering that what we're saying is being taken very seriously. For example, I was told about a fellow who helps quite a few fliers in his area. He tells newcomers to the hobby that the dropout rate is over 90 percent, and that there's no need to assemble your first model carefully since it will crash anyway. This is really a little distorted, and it isn't very encouraging. Another big mistake is criticizing beginners for their choice of machine and equipment. Simply because *you* prefer a certain helicopter doesn't make it the only viable choice. We must be open-minded to avoid alienating newcomers.

Flight Training

Now that we've successfully flown our machines in and out of forward flight, it's time to polish our forward-flight technique. Last month, we covered the basics of forward flight, and I hope you now have a feel for it. To perform any type of aerobatic maneuver well, we need to



A shot of the Washtenaw Helicopter Aero Modelers' (WHAM) newsletter—the “Helipad”—which is published monthly. This group of fliers is based in the Ann Arbor, MI, area, and the club holds monthly meetings. Contact me for further details.



Newsletter from the Miniature Rotary Wings of Virginia. As you can see, they have quite a group of fliers and much equipment. See text for more.

handle our machines well in almost any flight attitude. But you have to work up to this, and beginners should practice flying their machines straight and level at full throttle. Most machines will require that pressure be increased on the forward cyclic to prevent the helicopter from climbing. You should notice that the faster the helicopter is moving, the more stick pressure is needed. This is a normal effect, since the rotor disc is trying to pull the helicopter upward as well as forward, and the rotor disc must be tilted forward to counter this effect. Your helicopter will move through the sky quite rapidly, so

(to help if you get into a tough spot). That's quite an order to fill, but it's much less than what's usually required to teach a new pilot to fly a fixed-wing model aircraft.

Further, with the exception of the

HELI CHALLENGE

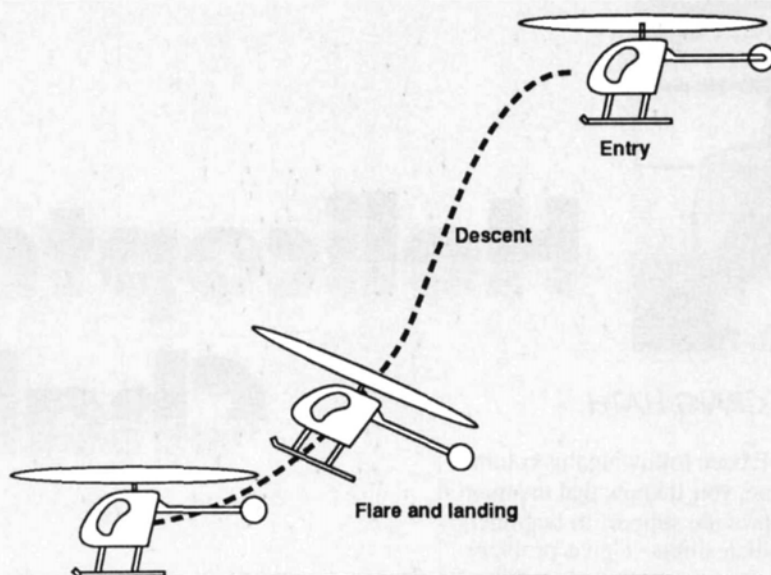
you'll need plenty of air space. At first, you might have to slow the machine to turn comfortably. As you go through a turn, you'll notice that if you maintain a fairly shallow angle of bank, there's a tendency for the tail rotor to wash out of the turn. Coordinate your turn by using tail rotor, and you'll find that the turn can be made almost flat. To avoid disorientation and to keep the helicopter from turning over, be careful not to over-roll it as you turn.

Fly several circuits, and try to get comfortable with your machine. Pay attention to the *sound* of the helicopter, as this is a good time to check for overloading of the rotor system. If the engine seems to be lugging, or over-speeding, you'll have to change the top-end pitch to correct the condition. Reduce pitch a little at full throttle if the engine is lugging, and increase the pitch if the engine over-speeds. Try to match the rotor speed so that it's nearly the same as at hover, if not just slightly higher. You should also be aware of the engine's needle setting. Look for just a little smoke from the exhaust, as it's a sign that all is well. If there's no smoke, land the helicopter and open the needle valve a couple of clicks. If there's a lot of smoke, try closing the needle very gradu-



During a recent attempt to resurrect my old Kalt Cyclone, the starting belt, which had become hard and cracked, decided to let go. Visible in the photo is a quick field fix: connecting three cable ties (it really works!). Thanks to my friend Dave for having the goodies handy, or I would have missed a session with this bird.

ally until this begins to clear up. Just try to get the engine to run dependably, as failure could be disastrous! Even though you might not have had problems in the past, you shouldn't have been flying around at full throttle before now, so be careful at first to be sure that you have everything working correctly. If you run the engine on the lean side, you risk overheating the engine. If you run the engine



Can you hit the spot? Even if you aren't ready just yet, it's still good practice to pick a spot to land your machine in. Making precision part of your practice routine will accelerate your training.

too rich, you aren't allowing the engine to run at full power, and you'll burn too much fuel.

Be sure that you slow the helicopter down to a normal flight speed before attempting to re-enter hover. Try this exercise in controlling the speed of the helicopter: Start by entering forward flight and, as soon as you have a grip on things, open the throttle wide with the helicopter going away from you. Make the first turn at full power and enter into a straight-and-level pass. Just as the helicopter passes in front of you, begin to reduce the power to just *above* that needed to maintain level flight. Begin the second turn toward you, and don't allow the helicopter to lose any altitude. When the helicopter is lined up for the approach, reduce the throttle and bring the helicopter back into a hover right in front of you. Practice these steps until you can put the machine right where you want it, and try flying the circuits in both left- and right-hand circles. This way, you'll avoid becoming dependent on making all your landing approaches from one direction. That should keep you busy for a few sessions. In the meantime, don't let your hovering work get rusty; do both, so that you can make progress in both areas.

Club News

I've received more newsletters from the Miniature Rotary Wings of Virginia. Newsletter editor Jim O'Brien noted that I hadn't responded to the club directly, and had, instead, mentioned in my column my desire to receive newsletters. Well, I now have egg on my face, as I was sure that I'd handled that detail! At any rate, by the

time you read this, my associate membership should be mailed off (thanks guys!). As I mentioned, the club is searching for a permanent flying site, and there appear to be some possibilities, if all the snags are worked out. Good luck to the group. If you want details on joining the club, or are interested in receiving its newsletter, write to me at *MAN* and I'll point you in the right direction.

I also heard from Carl Bogardus*, president of Aviation and Computer Enthusiasts (A.C.E.), a group of people interested in aviation and computers. The club is working to establish its own bulletin-board service and to provide services for members on flight planning, aircraft design, aircraft maintenance and record keeping, aviation flight simulators, aviation games, and programs for aircraft modelers. These groups can be an invaluable source of information and fun (especially for those hackers out there who also happen to be aviation nuts). Annual membership costs \$10, and this includes the group newsletter (published about every two months).

I really enjoy hearing from clubs anywhere, so if you're a member of a club or group that gets involved with helicopters (models or full-size), please let me know about what you do, and send a newsletter if possible. Thanks, in advance.

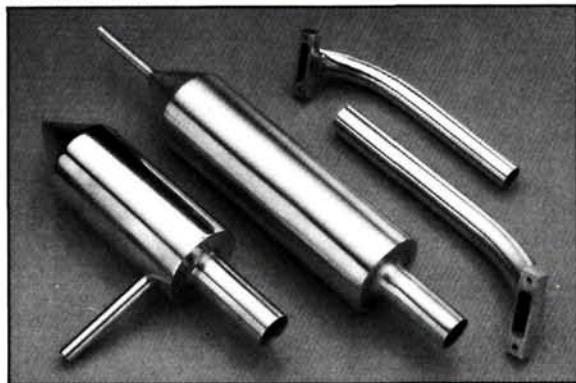
That's just about it for now; I have to get back to grinding balsa wood for our great editor who anticipates a fixed-wing review from me *very* soon. See you next month.

*Here's the address of Carl Bogardus: c/o A.C.E., 2009 Camelot Dr., Las Cruces, NM 88005. Tel. (505) 526-5645.

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BYRON BULLET

(Continued from page 106)

runway, spooled it up and launched. The Bullet accelerated rapidly, rotated in about 100 feet and broke ground about 50 feet later. Not much trim was required; a bit of down and some left aileron had the Bullet flying pretty much straight and level at a moderate speed throttled back to about 85 percent power. However, during a couple of the high-speed passes, a buzz could be heard, and I'm now sure it came from the rudder. Nick reduced the air speed, throttled back and set up for a landing approach that looked good until the engine signed off. The Bullet is no glider; it needs to be landed rather hot, nose-down, just as soon as you've lost the engine and have the best landing area you can find. This is not an unusual characteristic once wing loading on an airplane of this size gets above the 2-pound-per-square-foot mark. Don't try to stretch the glide—you can't! It hit pretty hard, but flat, and did no damage, other than bending all three gear legs back a bit. After re-bending the struts and recycling the gear a few times, we examined the rudder for linkage slop, gap clearances or anything else that might have contributed to the buzz. We found nothing. Subsequent attempts to get airborne that day were futile, as we couldn't get the engine to richen-up or respond in any way. The answer became obvious after further investigation. One of the carburetor hold-down screws had departed, so allowing the carb to unseat and causing an air leak that prevented the mixture from being richened.

Subsequent flights allowed us to observe the characteristics of the Bullet, one of which you should know about. The airplane rolls nicely, very smoothly and axially at the recommended aileron throws. However, if you execute a high-speed 180-degree turn, the airplane has a tendency to "over-bank," and this can result in a "tuck" to a nose-down, inverted and accelerating condition. That, friends, can be disconcerting! The airplane is fast—no doubt about it—and that's the very thing that could present a problem. I think the airframe is quite capable of literally outrunning its control surfaces, especially the rudder. If the airplane is capable of 140mph, it will never realize that potential, because the rudder buzz (and possibly flutter) will limit its performance. The existing rudder-linkage geometry, routing and actuation should be looked at more closely and revised. A consideration might even be to eliminate the movable

(Continued on page 118)

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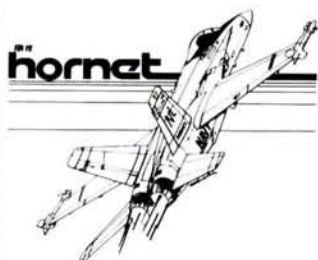
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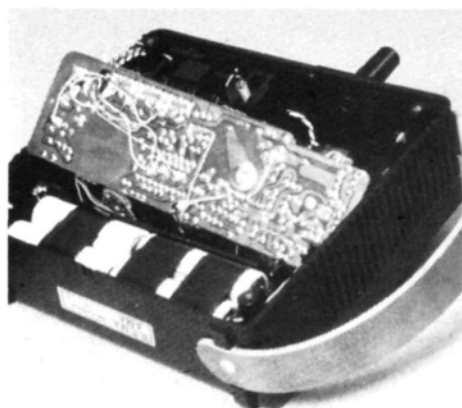


Hornet

Small Steps

by JOE WAGNER

ONE OF THE BEST features of small radio-control airplanes is their low cost. They don't use much in the way of materials; their engines are inexpensive and burn little fuel; and now there's a relatively cheap R/C system on the market that's well-suited to all but the tiniest R/C airplanes: Cox



Transmitter rework is simple, with complete access to the insides, as shown here. An 8-cell Ni-Cd pack fits where the original spring-type battery box once was. The leather strap handle is another extra.

Hobbies'* new Cadet III 3-channel outfit.

Cox's Cadet radio system has been on the market for quite a while, but, until recently, it was available only as a 2-stick, 2-channel rig with rudder on the right stick and elevator on the left. Although this setup is typical of all inexpensive 2-channel radios, I've never met any model airplane flier who likes the arrangement. It's fine for cars and boats, (where you steer with the right stick and regulate speed with the left) but for aircraft use, it's awkward.

The Cadet III transmitter is *much* better, with rudder and elevator both controlled by a dual-axis, single stick on the right. The other channel is set up for throttle, with a small trim-lever-type of control on the left side. There are reversing switches for all three channels, although Cox's ads don't mention this useful feature.

To minimize the cost, the Cadet III system is designed to use alkaline pen-

cells, which have a 1200mAh capacity and retain their charge for a long time between uses, (useful if you don't fly often). A fresh set of alkaline AA cells will power the Cadet III system for a little more than 4 hours.

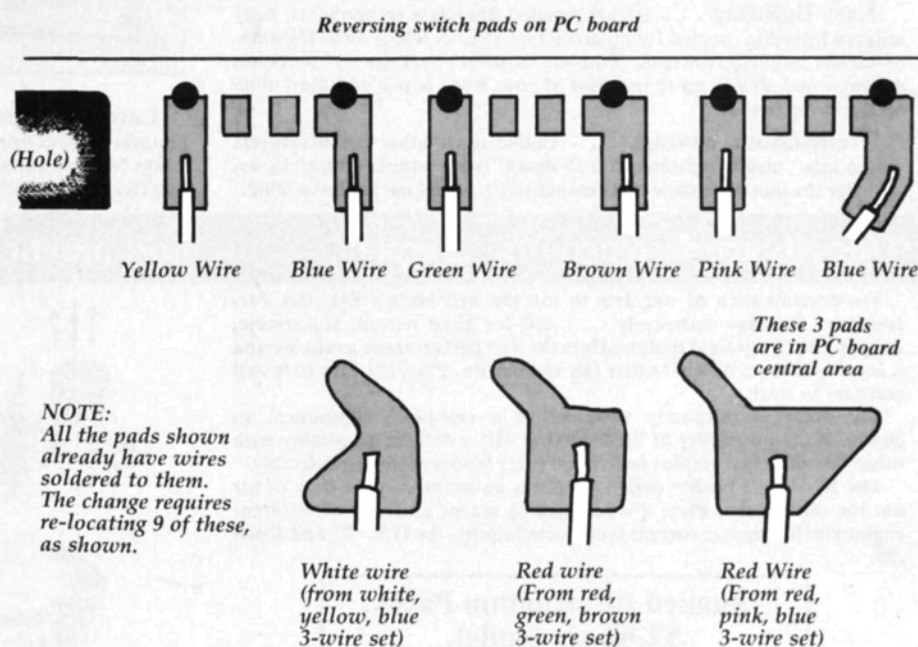
I prefer Ni-Cds, so as soon as I got my Cadet III, I converted the transmitter and airborne package to use them. This is easily done by simply inserting pen-cell Ni-Cds into the factory-furnished battery boxes. These boxes, however, have too many spring-loaded contacts that can go "bad", so to avoid this, I reworked the outfit to use all-soldered battery packs.

Modifying the receiver setup was easy; I cut off the battery leads at the plastic pen-cell box and soldered them to a standard Ni-Cd pack. (I chose to use the 275mAh size, but any 4.8V pack will work.) For recharging, I added a Deans charge-type connector, tying it into the wiring at the switch. The plastic cover on the rear of the receiver switch snaps together and comes off easily to expose the terminals. I soldered the positive-charge connector wire to the unused contacts of

the switch (which employs redundant wiring for extra reliability) and made a T-splice to join the negative-charge connector wire into the battery-receiver negative lead. The switch cover wouldn't fit back on after this rework. Instead, with nylon thread, I tied the wiring harness firmly together at the switch to eliminate flexing at the solder joints and prevent fractures. (The job only took about 10 minutes.)

The Cadet III transmitter required more time, mainly because I did more than merely install Ni-Cds. First, I took the back off the transmitter, and, with sharp wire cutters and long-nose pliers, I cut apart and removed both of the battery-connector end-terminal assemblies. I then installed a Deans charge connector on the left side (looking into the rear of the transmitter). This wasn't difficult, as the plastic case is soft and easily cut with an X-Acto knife. (There's already a charge receptacle in the Cadet III transmitter, but it's for an Airtronics-type plug, and all my Ni-Cd chargers are equipped with Deans-type connectors.)

(Continued on page 120)



Revision to Cox "Cadet 3" Transmitter PC board for compatibility with "Cadet II" receivers.

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BYRON BULLET

(Continued from page 114)

surface altogether; I'd just bet the Bullet would never miss it. This airplane isn't a lazy, slow-flying Cub that requires coordinated rudder and aileron input in the turns to avoid skidding; it's a high-performance jet that doesn't require much, if any, yaw input. In fact, I plan to do just that on mine: I'll glue the rudder into place and fair-over the hinge line.

Since the Bullet is the only non-scale jet in the Byron inventory, the reason for

its existence seems to be that it's intended as an entry into the sport jet market, where lack of scale requirements seemingly allow the designer to focus on developing a relatively uncomplicated, maneuverable, high-performance ducted-fan airplane. Unfortunately, the Bullet gives the impression of being an experimental airplane with excellent potential being pressed into operational (read consumer) service prematurely. It's really a shame, too, because it could be a fun jet, and one of its type is surely needed. The Cloud Dancers demo team from Florida has been flying the

Bullet and the Byron F-15 in air shows for some time now. They've developed a number of modifications to the Bullet, and these include a revised rudder hinge line (perpendicular to the attachment area of the vertical fin) and bonding 2-ounce fiberglass cloth to the wing surfaces to eliminate any flexing tendencies. They seem happy with their "revised" Bullets, and perhaps Byron Originals will consider incorporating those mods. Don Mudiman, one of the Cloud Dancer fliers, has agreed to prepare an article that we hope to present in the next issue. It will describe the modifications they've made that allow the Bullet to close in on its potential. Until that happens, buy, fly, throttle back, and don't chase small poisonous snakes!

*Here are the addresses of the companies mentioned in this article:

Byron Originals, P.O. Box 279, Ida Grove, IA 51445.

Dan Parsons Products, 11809 Fulmer, NE, Albuquerque, NM 87111.

Loctite Corp., 18731 Cranwood Park, Cleveland, OH 44128.

Top Flite Models, 2635 Wabash Ave., Chicago, IL 60616.

World Engines, 8960 Rossash Ave., Cincinnati, OH 45236.

K&B Manufacturing, 12152 Woodruff Ave., Downey, CA 90241.

QUIET FLIGHT

(Continued from page 53)

glider has the proper color and markings. There are 20 scale powered gliders for those inclined toward the use of propellers. (Some of the aircraft are shown in museum settings and some are photographed on the flight line.) Three-view drawings are also available for many of the gliders in Scale Model Research's line, which encompasses aircraft from primary trainers to fiberglass super ships.

● DCU*, maker of the Dragon Fly and the Super Dragon Fly has added another hot sloper to its line. The Stryker is a 48-inch-span, 2-channel, sport aerobatic model resembling a cross between an F-18 Hornet and a Stealth Bomber. The kit will feature a one-piece fiberglass fuselage, clear canopy, foam wings, machine-sanded balsa and plywood parts, extensive hardware and plans.

● Marty Silberstein and Steve Peacock, proprietors of Cliff Hanger Models* (formerly Sailplanes Only) have added a couple of new models to their PSS line of slopers. To their Kawasaki KAI-100-2, P-40 Warhawk, and F-5, they've added a Corsair F4U and an F-20 Tigershark. All the models have a wingspan of between 40 and 50 inches and use two channels on

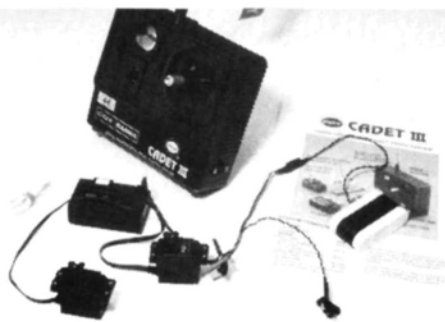
(Continued on page 123)

SMALL STEPS

(Continued from page 116)

Next, I made up an 8-cell pack of 550mAh Ni-Cds, assembling them around a length of 1/4-inch-square balsa to keep them aligned. This fit neatly into the transmitter's battery space. With a short self-tapping screw at each end, I attached a leather strap handle to the throttle side of the case. (I notched the plastic "foot" on the bottom for the strap so the transmitter would still stand upright.) All my R/C transmitters have strap handles on their left sides so that they're easier to hold, particularly when I'm flying alone.

Finally, I rewired the transmitter's channels. This isn't really necessary, but I wanted to be able to operate my 2-channel Cadet receiver with the Cadet III trans-



The Cox "Cadet III" system complete (modified with Ni-Cd batteries in both transmitter and receiver). Note the Deans charge receptacle on the transmitter side. It's easy to install.

mitter. I don't know why, but channel 1 of the Cadet III system is the throttle, so when you use a stock Cadet III transmitter with a Cadet II receiver, you still have rudder and elevator on different sticks.

However, it's very easy to change the channels from one control to another: On the circuit board, you simply relocate nine wires, which are simply surface-soldered to fair-sized pads. If you're good with a pencil-type soldering iron, the job takes only a few minutes. The circuit board slides right out to allow full access, and there's ample slack in the wires for all the manipulation you need.

The accompanying diagram shows the new location of the nine wires. The Cadet III transmitter is now compatible with both 3-channel and 2-channel receivers. (On the 3-channel set, channel 3 doesn't operate the throttle.)

Although the airborne portion of the Cox Cadet III isn't nearly as tiny and light as Cannon's Super Micro R/C system, it's still very suitable for most 1/2A R/C models. With a 275mAh Ni-Cd pack, the airborne package weighs a mere 6 1/2 ounces with the two servos that come with the

system, and 7 1/2 ounces with three.

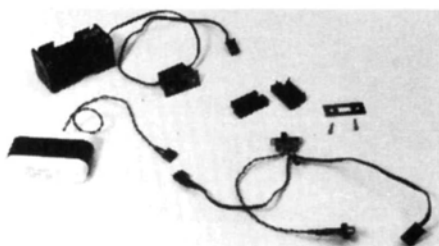
Whip Antennas

Randy Randolph thinks I'm some sort of a nut for doing this, but I use nothing but vertical whip antennas on my R/C airplanes. My field-strength meter verifies



Even an all-plastic ARF, like the new Cox .049 Typhoon held by Diana Joseph, can benefit from using a vertical whip antenna.

that the received signal voltage is higher with a whip than with a trailing wire, particularly when the receiver and the transmitter are close to the same altitude. The difference between them is particularly large when the trailing wire is pointing in the direction of the transmitter (as it often



Cadet receiver battery setups; the stock 4-cell-type at rear. It's easily modified into the Ni-Cd system shown in front. The charging receptacle is added after removing the snap-off switch's rear cover.

is during takeoffs, climb-outs and landings).

Because of the highly efficient Automatic Gain Control (AGC) circuits in our receivers, trailing-wire antennas do work, and nearly everyone uses them, but I'm extremely cautious with my R/C models, so I do everything I can to maximize the reliability of my equipment. Vertical whip antennas seem well worth the extra trouble it takes to install them.

Actually, it isn't difficult. First, I carefully measure the length of the stock antenna wire from the receiver case; then I shorten it, leaving a "pigtail" approximately 1 foot long. To the end of this, I solder a miniature solder lug, and then I

reinforce the joint with 1/2 inch of heat-shrink tubing to prevent excessive flexing at the connection.

Next, I solder a 3-foot length of .047 music wire into a solder-type pushrod connector (the kind with a 2-56 threaded end). Using a 2-56 nut to temporarily at-

tach this end to the solder lug on the receiver's pigtail, I stretch out the new antenna assembly. Then I cut the music wire at precisely the same distance from the receiver case as the original antenna length.

To prevent eye injury, I wrap the end of the music-wire whip with thin copper wire and solder it into place, then I CA a small wooden bead over it. In the airplane, I use CA to firmly attach a 2-56 blind nut in a convenient place—usually in the fuselage bottom somewhere amidships. The solder lug on the receiver pigtail is positioned over this and held in place along the wire with sticky tape. Then I make a corresponding hole in the fuselage top (or wing) so that the whip can be inserted from above and screwed firmly into place in the blind-nut. This clamps the solder lug tightly against the shoulder of the whip's threaded connector and ensures good electrical contact.

To make the whip less obtrusive when the airplane isn't being flown, just bend it backwards and hook the bead onto some convenient place on the model's tail, e.g., the rudder-control horn. Although .047 music wire is quite flexible, the antenna doesn't bend very much in flight. It produces little drag, and its natural "springiness" keeps it nearly straight. Give vertical whip antennas a try. I'm sure you'll agree that trailing wire antennas don't compare!

**Here's the address of the company mentioned in this article:*

Cox Hobbies, Inc., 1525 East Warner Ave., Santa Ana, CA 92705. ■

QUIET FLIGHT

(Continued from page 118)

elevator and aileron.

The kits include fiberglass fuselage, foam cores and paper templates for tail surfaces. There are rumors that there's a P-51 in the works. If you want a hot sloper that looks like a full-size aircraft and is capable of aerobatics and high-speed flying, check these out!

• Great Planes'* new Electro Streak aerobatic model is a sharp-looking, shoulder-wing, all-wood kit. The model comes complete with a hot motor, a prop and a prop adaptor, and it's designed for 6- or 7-cell operation. I've talked to some of the people at Great Planes, and they claim that the Streak's performance will really surprise electric modelers.

• Global* will be the exclusive importer and distributor of Sailplanes International of England, importing eight new sailplanes: the ASW 20, Racer CS, Osprey 100, Axle, Sitar Special 100, Mini-Racer, Ridge Racer, and Secret Weapon.

At the show, Global displayed three models and one kit: the Osprey 100, the Sitar Special 100, the Mini-Racer and the Secret Weapon. The Osprey 100 is an all-wood thermal model with a modified Eppler 176 airfoil utilizing rudder/elevator control with optional spoilers. The Sitar Special 100 has a fiberglass fuselage and obechi pre-sheathed foam epoxyglass-reinforced wings with an Eppler 193 airfoil. It's designed for thermal or slope soaring with rudder/elevator and aileron control with optional spoilers. The Mini-Racer is a very stylish, 60-inch-span, fully aerobatic sloper with rudder/elevator and aileron control. It has a fiberglass fuselage and obechi pre-sheathed foam wings. The kit shown was the Secret Weapon, which features obechi pre-sheathed foam wings and a built-up wooden fuselage, and uses rudder/elevator and ailerons.

The rest of the models in the Sailplanes International line are all slope soarers with fiberglass and obechi pre-sheathed foam wings. It's nice to see someone importing this great line of sleek, good-looking English models.

Most of the new products shown were oriented toward slope-soaring enthusiasts, and this is pleasing, as slope soaring has been a rather neglected area of "Quiet Flight." Electrics and thermal models were also represented with new products, but not in the abundance we've seen in the past.

I apologize if I missed anything, but it's very difficult to see everything. If you're a manufacturer or importer and you have

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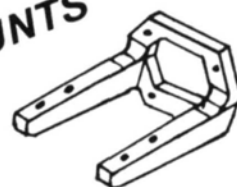
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After the show, I went to Wilshire Hobbies. Over the years, the shop has become a favorite spot for soaring and electric enthusiasts. I had heard rumors that the shop was going to close, so I asked proprietor Bob Ratzlaff if the rumors were true. Bob emphatically stated that Wilshire would stay open and continue to carry sailplanes and electric accessories from Europe. As a matter of fact, Bob says he'll import an exciting new line

of aircraft from Germany. He had only one brochure in German, so I wasn't able to get much information. There are a couple of competition-type models and several scale gliders, and Bob promised to send me more info and pictures when they're available.

Till next time...good thermals and a full charge!

*Here are the addresses of the companies mentioned in this article:
Astro Flight Inc., 13311 Beach Ave., Marina Del Rey, CA 90292.

(Continued on page 126)

NAME THE PLANE CONTEST

Can you identify this aircraft?

If so, send your answer to **Model Airplane News**, Name the Plane Contest (state issue in which plane appeared), 251 Danbury Rd., Wilton, CT 06897.



Congratulations to Kent Brown of Monument, CO, for correctly identifying the Short S.B.6 Seamew shown in our January '89 issue. Kent's entry was drawn from the 34 correct answers submitted.

The Seamew was a light, anti-submarine aircraft designed for operation from escort carriers and small coastal airfields. With simplicity as their goal, the Seamew's designers employed a fixed landing gear and manually folding wings. First flown on August 23, 1953, the airplane carried a crew of two and was powered by a single Armstrong Siddeley Mamba turboprop engine.



The wing spanned 55 feet, and the fuselage was 41 feet long. As a number of entrants pointed out, the relatively straight lines and generous flying surface areas would make the Seamew an excellent modeling subject...once you got past the basic homely!

The winner will be drawn four weeks following publication from correct answers received by postcard delivered by U.S. Mail and will receive a free one-year subscription to **Model Airplane News**. If already a subscriber, the winner will receive a free one-year extension of his subscription.

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QUIET FLIGHT

(Continued on page 123)

Jomar Products, 2028 Knightsbridge Dr., Cincinnati, OH 45244.

Leisure Electronics, 22971 B Triton Way, Laguna Hills, CA 92653.

Jarel Aircraft Design and Engineering, 11367 Culver Blvd., Los Angeles, CA 90066.

Scale Model Research, 2334 Ticonderoga Way, Costa Mesa, CA 92626.

DCU, 1556 S. Anaheim Blvd., Unit C, Anaheim, CA 92805.

Cliff Hanger Models, P.O. Box 9081, Torrance, CA 90508.

Great Planes Model Distributors, P.O. Box 4021, Champaign, IL 61820.

Global Hobby Distributors, 10725 Ellis Ave., Fountain Valley, CA 92728. ■

PATTERN MATTERS

(Continued from page 57)

ners (one on each side of the fuselage) and set the servo tray into the fuselage, pressing it firmly into the silicone. Yes, you'll see silicone oozing out here and there, but not to worry.

Now that the tray is in place, take the second set of runners and place them on

top of the tray along the fuselage sides to sandwich the tray in place. Allow the silicone to dry completely, and that's it! Believe me, it will take a major, major disaster to shake the tray loose from the silicone. However, if you want to remove the tray for any reason, a sharp hobby knife is all it takes to slit the silicone and remove the tray. I also use silicone to install the fuel-tank floor, to seal any holes through the fire wall created by fuel lines and throttle links, and to hold the retracts' air reservoir in the fuselage for my pneumatic retracts. Try this method some time; I think you'll like it.

Peak-Detection Chargers

My last tip for the month concerns field-charging batteries. I've used many field chargers over the years, but one of the best I've ever run across was actually stolen from my R/C cars. Car drivers use a variety of chargers for recharging the Ni-Cds in their cars. The most popular and reliable are the peak-detecting type, which work by reading the amount of voltage a battery pack has in it during the charge cycle and cutting off the charger when the battery is absolutely topped off.

The method is simple: Whether you're charging a 4-cell receiver or an 8-cell transmitter pack, while the charger pours power into the pack, it also reads the pack's voltage. As the pack gains voltage and tops out, any excess power poured into the cell will cause two things to happen:

- The excess voltage won't be held by the battery, and this excess power will be transformed into heat.
- When this state of maximum charge has been reached, if you continue to pour in power, the battery voltage actually begins to decline. The peak detector watches for this drop in voltage and shuts off the charger at the first loss of about 1/10 of a volt. Safe, easy charging!

Several manufacturers make these units, and if you decide to use one, make sure that you select one that has an adjustable power setting, so that you can take advantage of any battery situation you run across. With this type, you set the amount of voltage and amperage being fed to the pack, and thereby guarantee the safest charge.


By the way, most of these chargers work from any 12V source, so you can easily drive them from your flight box's 12V battery. Just plug into the box and then into the plane; hit the juice button, and you can walk away confidently knowing the pack will be at maximum charge for your next flight. And don't leave the charger at home when you hit the contest

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trail, as that's when you'll need it most.

Revised T.O.C.?

One last thought: Having seen the most recent Tournament of Champions, I think the event is no longer what it was intended to be. This event was the brainchild of Walt Schroeder (then editor of *MAN*) and Bill Bennett back in the early '70s. At that time, champions from a couple of dozen countries competed against one another for the honor and prestige of winning the event. Today, however, this event is more like an "America versus 10 others" event. About half of the pilots are Americans,

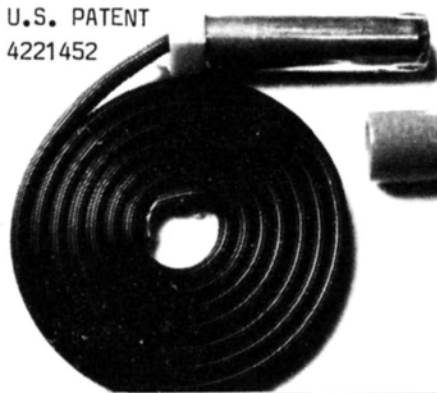
and the invitees from other countries aren't necessarily the *current champions* of those countries. This is the premier event for aerobatics in the world, but let's get this into perspective: If the contest is the Tournament of Champions, then let the *current champions* of each country be invited. Nuff said, this month, and until next time, we're on the pipe with afterburners.

**Here are the addresses of the companies mentioned in this article:*

Sullivan Products, 1 North Haven St., Baltimore, MD 21224.

Hot Stuff; distributed by Satellite City, P.O. Box 836, Simi, CA 93062. ■

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YELLOW A-4

(Continued from page 69)

using their spray cans! The lower surfaces and the brown camouflage pattern top-sides were applied using a spray gun and/or airbrush. The national insignias were shot through card-stock stencils using the airbrush, which was also used to apply the weathering and panel streaking. I like using the Chevron paints, because they're easy to handle, the flats dry quickly, and they're available in a broad range of colors that match many military hues. When all the color had been applied, using a three-view for reference, I added the ink panel lines, followed by some transfer lettering for numbers and placards. Back to the K&B Superpoxy: this time, the clear with satin hardener, to spray on two, light topcoats that protect the finish and seal all the markings.

PERFORMANCE: Having seen any number of these Skyhawks fly, I admit to having no doubts about its flying ability. At the 1988 Bay of Quinte Jet Rally, they were buzzing around like gnats! Everyone I talked to seemed pleased with the airplane. One of the guys I talked to was a fellow from Washington state by the name of Mike Barger*. He had built any

number of them for a growing number of fan enthusiasts who didn't have the time to build. He had given me a number of suggestions to follow while building my own (remember, I only had preliminary instructions), and I ordered one from him as a back-up ship. His prices are fair, and he'll finish to any level you want, including painted and test-flown! He specializes in Yellow Aircraft and Byron Originals* kits, so if you require this type of service, contact him for additional information.

I've been using the Dynamax*/O.S. 77 combination for a while now, so the starting drill has become routine. After filling the 24-ounce Du-Bro* tank, I removed the plug, squirted a few drops of prime into the cylinder, and reinstalled the plug. I left it slightly loose to avoid putting a too-heavy load on the starting probe, which is inserted through the right-hand inlet. The plug is snugged-down after the engine has been fired up, and the removable hatch is then installed.

The ground handling of the A-4 in anything above a slight breeze requires attention. Its narrow track gear isn't very obliging under crosswind conditions, and unless you're a purist who enjoys refinishing wing tips, I suggest that you consider installing wing-tip skids, or, better

yet, flush pieces of music wire that will serve the same purpose, yet be unobtrusive.

On the other hand, "air" handling is a "Hawk of a different color." After take-off, the A-4 tracks quite smoothly and handles very well. The suggested aileron throws might be a bit much, but with the current crop of radios with dual-rate features, you can tune things to your liking. Having no real method of measuring speed, I can only estimate it. Whatever it is, it *looks* right! For the number chasers out there, I *estimate* around 120 to 125mph, which is plenty fast for most guys. As I said, the important thing is it *looks* right! You'll find no surprises in the landing pattern either; for all its honesty, this airplane could be called the Abe-4. Stalls are abrupt and you should be ready for them, but if you keep the speed up, you'll be fine. If you "flame out," just keep the nose down and head for home; the A-4 appears to have a lot of duct drag when the fan stops, so it wants to slow down rapidly.

Like its full-scale counterpart, the Yellow Skyhawk seems to be a "friendly" airplane. It's certainly attractively priced and a good package for the investment. It

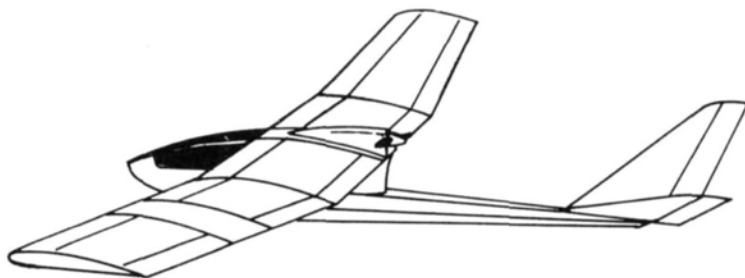
(Continued on page 136)

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"LEARNING TO FLY R/C With or Without An Instructor," \$2.95 plus 65¢ postage. Jim Waterman, 3818 Deerfield Dr., San Antonio, TX 78218.

U.S. FIGHTER ART! Beautiful line-art prints of 4 exciting American warbirds: P-26-A Peashooter, P-51-D Mustang, F-16 Falcon, Stealth Fighter. 11"x14". \$6.95 each, all 4: \$25. Aerographics, 7898 E. Acoma, #208, Scottsdale, AZ 85260.

Send ad and payment to *Model Airplane News*, 251 Danbury Rd., Wilton, CT 06897. **Non-Commercial classified ads** (commercial ads of any kind not accepted at this special rate). Rate: 15 words or less, \$4.50 payable in advance. No charge for name and address. Additional words, 25¢ each. **Commercial classified ads** (rate applies to anyone selling on a commercial basis—retailers, manufacturers, etc.) Rate: 50¢ per word, payable in advance. Count all initials, numbers, name, address, city and state, zip and phone number. **Closing Date** for either type of ad is the 20th of the third preceding month (for example, January 20th for the April issue.) We do not furnish box numbers. If you would like your ad run in more than one issue, multiply amount of payment by number of months that ad is to run. It is not our policy to send sample copies of tear sheets.

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WANTED: RTF U/C planes and U/C race cars, mite cars; complete or pieces, with or without engines. Buy or trade. John Fietze, Box 1521, Amagansett, NY 11930.

WANTED: Old, solid kits of prop-driven commercial aircraft (Strombecker DC-3, DC-6, DC-6B, Convair 240, Comet DC-6, Maiercraft DC-3, etc.). Incomplete kits, built or damaged models also acceptable. I also want cast metal props, cowlings, struts, wheels, & spinners intended for 40s solids. William Keel, 3653 Manana Dr., Dallas, TX 75220.

Club of the Month



The Joint Military R/C Flyers Club
The Joint Military R/C Flyers Club is the *Model Airplane News* "Club of the Month" for April '89.

Flying out of Camp Pendleton in California, most JMRCF members are military personnel, although there are some civilians and retired military people in this mini "Top Gun" club.

With such a strong military background, you'd think that the club wouldn't face the problems encountered by most modeling clubs, but, just like everyone else, JMRCF members recently lost their flying site—the "Main Field"—to a less-than-enthusiastic commanding officer. They don't expect to get the site back during the tenure of the CO, but there's some hope of an alternative that could be arranged by Base Facilities. Despite this forced relocation, the club members seem to be in good spirits and fly regularly.

The club newsletter—appropriately named "The Corsair"—is the handiwork of Editor Charlie Greb. "The Corsair" contains lots of information about current and future club activities, which include fun flies, banquets, raffles, and what you might expect from the few and the proud: combat flying. Other sections of the "to-the-point" newsletter include a little radio-control humor, the minutes of the past club meeting and notes from the club's governing members.

It's with great pleasure that we at *Model Airplane News* award two one-year subscriptions to the Joint Military R/C Flyers. As usual, these subscriptions are to be awarded by them to a couple of the club's outstanding members. ■

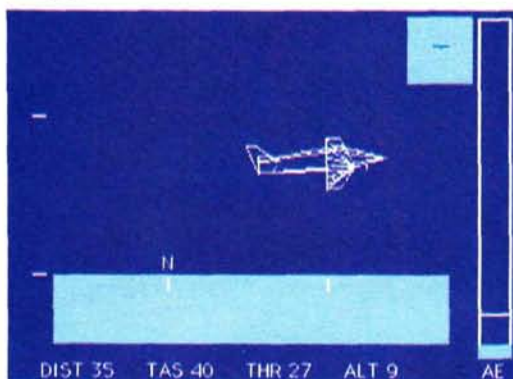
Each month *Model Airplane News* will select the club newsletter that best shows the club's activities and energies directed toward the furtherance of the hobby. The award is not based on size or quality of the newsletter, and can be about any aspect of the hobby (F/F, C/L, R/C, boating, cars, etc.). *Model Airplane News* will award two free one-year subscriptions to be given by the club to outstanding junior members. So send your newsletter to *Model Airplane News*, Club of the Month Contest, 251 Danbury Rd., Wilton, CT 06897.

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Byron Originals, P.O. Box 279, Ida Grove, IA 51445.

Dynamax; distributed by Jet Model Products, 304 Silvertop, Raymore, MO 64083.

Du-Bro Products, 480 Bonner Rd., Wauconda, IL 60084.

HORNET

(Continued from page 78)

Rough-cut the nose cone and glue it to the fuselage. Pre-shape the leading-edge extensions before fastening, and fillet them into the tops of the intakes as well as into the wings. Build the exhaust cones from surplus sheet and triangle stock, then glue them into place. Sand the entire airframe to the finished shape.

Now to the tail feathers/ailerons: Assemble the fins and stabilizers from 1/4-inch square balsa and 1-inch elevator stock. Cut the ailerons from 1-inch elevator stock and temporarily hinge them to the wing. Sand all tail surfaces and temporarily hinge the elevators.

COVERING: Except for the tail cone and the intakes, I highly recommend Super MonoKote* for the entire airframe. Mask these areas and seal the wood with thin CA, then paint with dark grey, fuelproof paint. Cut away the sheeting for the landing-gear slot. There aren't a lot of color schemes for the Hornet, but some are quite colorful. My prototype looks great in white with blue and gold trim. Another good choice is blue with yellow trim—the Blue Angels' colors. The camouflage markings of the Australian F-18s are also interesting. Stay away from the military gray that's difficult to see at any distance.

FINISHING: Cut away the covering where the fins and stabs are attached. Draw a center line and drill holes for the toothpick dowels. Glue the tail surfaces to the fuselage, being sure to set the proper cant to the fins. Add the landing gear and attach the wheels (2 1/4 inches for grass fields). Install the engine and Perry pump at the fire wall and, to protect the prop, glue the wire skid to the motor mount.

To save time, my second Hornet was test-flown without canopy and markings. I wasn't really sure if I had licked the stability problem, so why put in an additional 10 hours of labor when I might lose it again?

The range check was performed, and the Futaba* FGK operated flawlessly. I fired up the O.S., checked the throttle response and tweaked the needle.

At this point, I'd have been happy to call it a day, but my curiosity wouldn't

(Continued on page 138)

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YELLOW A-4

(Continued from page 130)

will consume some time in the building process, but I think you'll be pleased with the result.

Oh, yeah; that one I ordered from Mike Barger? It will be pressed into service quicker than I thought. As you can see from one of the photographs, my review airplane is a memory! The postmortem

seems to indicate a failed switch, or perhaps a battery or something else electrical. I just *knew* I'd want a second one!!

*Here are the addresses of the companies mentioned in this article:

Yellow Aircraft & Hobby Supplies Ltd., Suite 201, 3040 Palston Rd., Mississauga, Ontario, Canada, L4Y 2Z6.

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HORNET

(Continued from page 136)

allow it. "So this is it, once again," I said to the idling engine. I crossed my toes and advanced the throttle to full afterburner. Down the runway it charged and with just a breath of elevator, the Hornet rotated into the air. Then disaster struck! I heard a rock strike the prop and the rpm increased considerably. There was nowhere to land; just trees and rocks ahead. I had no choice but to carefully milk it through a complete circuit. After what seemed like a time warp, it was on final and on glide

slope and an uneventful landing followed.

I discovered that a large chunk of prop was missing. What had originally been a 9-inch was now less than a 7-inch prop, yet the Hornet had flown reasonably well. I was very anxious to try a new prop and to pick a clearer takeoff run.

The second flight was perfect: After a few high-speed passes that bordered on Mach 1, I took the Hornet to 500 feet for stall and spin testing and there was no stalling. With full up-elevator, it would start a nose-high descent with the ailerons completely controllable; perfect for carrier-style landings. Spins were nothing

more than descending spirals that stopped immediately when I neutralized the controls.

It's hard to describe the feeling of flying a dream come true. Just the silhouette of the Hornet "pulling Gs" in a climbing turn is enough to raise the hackles on the back of my neck. Does this mean I'm no longer just a pilot, but now a naval aviator? Your Hornet should fulfill your "need for speed" but remember, avoid the blunt end of the boat!!

*Here are the addresses of the companies mentioned in this article:

(Continued on page 140)



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HORNET

(Continued from page 138)

O.S.; distributed by Great Planes Model Distributors, 1608 Interstate Dr., P.O. Box 4021, Champaign, IL 61820.

Perry Automotive, Inc., 1568 Osage St., San Marcos, CA 92069.

Carl Goldberg Models, Inc., 4734 West Chicago Ave., Chicago, IL 60651.

Sig Manufacturing Co., 401 S. Front St., Montezuma, IA 50171.

MonoKote; distributed by Top Flite, 2635 S. Wabash Ave., Chicago, IL 60616.

Futaba Industries, 555 W. Victoria St., Compton, CA 90220. ■

ABOUT THOSE ENGINES

(Continued from page 91)

.40TV with a neat, streamlined, spinner nut. This not only looked good, but also met the AMA's recommendation for a "safety nut," and provided a convenient center point for an electric starter. One day, the Enya became a little cranky. It didn't want to run, but, with persistence, the flier managed to get it going well enough to fly. The airplane climbed out fairly well, then, with a sudden "BANG," the engine stopped and the prop whirled off. I wasn't there when this happened, but as soon as I heard about it, I knew what had caused it: Repeated electric starting via the spinner nut eventually loosened it....

A control-line flier had a problem with a new O.S. .19. It ran well, but produced a horrid black "goop" that spread over the nose of this airplane. The stuff obviously wasn't coming from the exhaust stack, and the only other likely source was "blowby" from the front bearing. But, if so, why was it jet black? Besides, there was no sign of excessive play in the shaft, either radially or fore-and-aft.

The cause was the mounting screws, which were snug, but not tight enough to keep the engine from shifting around while running. The black stuff was wear particles produced as the screw heads eroded the O.S.'s mounting lugs. This, mixed with the oily residue that collects on model engines, produced the inky-black goop that spread all over the engine.

This incident, and those of the loose propellers, shows the importance of regularly checking the tightness of all threaded fasteners on our engines. While running, model airplane motors vibrate constantly, and vibration is the major cause of screws loosening. A model engine component doesn't have to be rattling to make trouble. Check those fasteners frequently!

One difficulty often encountered when

(Continued on page 144)

ABOUT THOSE ENGINES

(Continued from page 140)

getting some modern R/C engines to run reliably throughout their speed range is touchy carburetor controls. Trying to find the optimum setting can be maddening. The difficulty is usually caused by insufficiently fine threads on the adjustments, and occasionally by blunt-ended needles. Some of these, e.g., those used to regulate "air bleed" in certain O.S. carbs, have no tapered points at all.

The only ways I know of overcoming this kind of difficulty are: Replace the carburetor with a better one, e.g., a Perry; or exercise great patience to find the optimum positions for the carb adjustments, then *leave them alone*.

There's far too much needle-twiddling taking place on today's flying fields anyway. If you set your mixture a tad on the rich side, stick to the same brand of fuel and glow plug, and make sure the latter aren't old and weak. Once your carb controls have been set, they'll work nicely for a long time. And if your motor begins to give problems, look for a loose screw *before* messing around with the carburetor adjustments. Keep taking the easy route!

SPORTY SCALE

(Continued from page 98)

coming. I really enjoy some of the humorous ones. And yes, if you do a 180 and stand on your head, you *will* be facing the right way. It doesn't matter how you do it; just make sure that you do. Check your six.

**Here are the addresses of the companies mentioned in this article:*

Top Flite Models, 2635 S Wabash Ave., Chicago, IL 60616.

Pica Enterprises Inc., 2657 N.E. 188 St., Miami, FL 33180.

Dave Platt Models, 6951 Northwest 15th Ave., Fort Lauderdale, FL 33309.

Jemco (Dynaflite), 1578 Osage, San Marcos, CA 92069.

Bob Violett Models, 1373 Citrus Rd., Winter Spring, FL 32708.

Bob Holman Plans, P.O. Box 741, San Bernardino, CA.

Mark's Models, c/o Dynaflite, 1578 Osage, San Marcos, CA 92069.

Great Planes Model Manufacturing Co., P.O. Box 788, Urbana, IL 61801.

Royal Products Corp., 790 West Tennessee Ave., Denver, CO 80223.

Sig Manufacturing Co., 401 S. Front St., Montezuma, IA 50171.

Jet Hangar Hobbies, 12130 G. Carson St., Hawaiian Gardens, CA 90716.

Byron Originals, P.O. Box 279, Ida Grove, IA 51445.

Nick Zirol Models, 29 Edgar Dr., Smithtown, NY 11787.

GOLDEN AGE

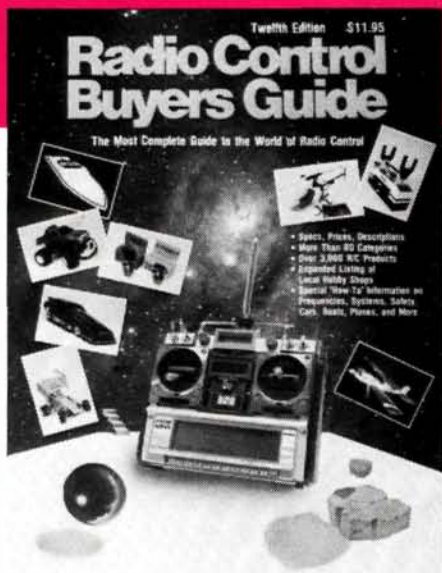
(Continued from page 101)

day, a chance meeting with Dunham brought an offhand comment from him: "You know, deBolt, if you win with that analog, you'll set the whole digital scene on its ear!" Fortunately for digital, I guess, I *lost* by two points. You see, in those days, radio sales were very much more influenced by contest performance than they are today. Today's brands are so similar that you take your pick and will probably do as well with one as with another. 'Twasn't always so!

Senior Plans

Just a brief note for plans seekers: The first Live Wire design was the result of a collaboration between me and Bill Winter. The Senior established the basics for all future cabin-style R/C designs. While it was a "first," there has also been much recent interest in it because it would fit the current OT R/C needs quite neatly. Unfortunately, plans haven't been available, but Bill Weaver* recognizes its merits and is still flying one. Willie Richards of Beaumont, TX, asked Bill for a copy of the plans (he once had one of

(Continued on page 146)



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GOLDEN AGE

(Continued from page 144)

only 250 kits produced, but had lost the drawings). Bill obliged by tracing a vellum from the original—and very well done, too. Best of all, for just the cost of copying and mailing, Bill is willing to send copies of the drawing to interested OTers. Check with him for details. One of the outstanding things about modelers is the appreciation they have for the needs of fellow enthusiasts, and for his efforts, Bill Weaver ranks high amongst us!

Finally! Our Own Place

I also have some really great news that you might have already read elsewhere. First, Joe Beshar* called to say that the response to his Nov. '88 announcement in *MAN* about an OT R/C organization had been encouraging. Later, he called again to say the response was so great that the organization should be started. What delightful news! (especially after such a long gestation period). It has been two years since Bill Winter recognized our needs and we started to put out "feelers" for his idea. Do consider joining us, as the

organization will need the strength of numbers to be all it can be. You can contact Joe Beshar for membership applications and information. Come and join your fellow OT R/Cers in the "Vintage R/C Society!"

*Here are the addresses pertinent to this article:

Lou Andrews, 204A New Castle Dr., Center Barnstead, NH 03225.

Bill Weaver, P.O. Box 373, Middletown, MD 21769.

Joe Beshar, 198 Merritt Dr., Oradell, NJ 07649.

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